American Gas Association MONTHLY

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New Industrial Gas Horizons

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CP Range—Postwar Spearhead

April 1944

VOLUME XXVI NUMBER 4

"...and I'll live like a princess in a house that runs like magic..."

"I have a wonderful post-war dream . . .

"I'm always fresh as a daisy, pretty as a picture . . . and housekeeping — in my new all-Gas home of the future — seems like play!

"I work in a kitchen that's cool, clean, free from cooking odors . . . where, with no trouble at all, I turn out dishes that make my family want to hug me. For my new Certified Performance Gas range is amazingly efficient — with heat controls so accurate they cut out all sorts of work and watching . . . save food values and cooking time!

"I open my magic Gas refrigerator . . . my silent storeroom . . . and what do I see? . . . All kinds of foods, meats, vegetables, even frozen foods . . . Yes, special cooling units keep them fresh longer, save hours of marketing time.

"I turn on my permanent 'hot springs' . . . and an automatic Gas water-heating system gives me oceans of hot water whenever I want it.

"Why, even the weather is mine for the asking . . . for my new Gas air-conditioning system gives me luxurious warmth in January, mountain coolness in July!"

Dream on, lady . . . For tomorrow these and other miracles of comfort will be brought to you by the tiny blue Gas flame . . . *the flame that cools as well as heats.* You can speed that day by using Gas wisely . . . and by saving for your home of the future with every War Bond you can buy.

THE MAGIC FLAME THAT WILL BRIGHTEN YOUR FUTURE

AMERICAN GAS ASSOCIATION **GAS**

American Gas Association MONTHLY

CONTENTS FOR APRIL 1944

There is increasing evidence that the gas industry is fast awakening to the problems of the future and intends in no uncertain terms to do something about them. Postwar committee studies and talks last Fall about "the fear of peace" and the intensity of postwar competition, have had their effect. . . . One result has been an accelerated research program, frankly discussed by gas men and manufacturers alike at the precedent-breaking Cleveland and Los Angeles conferences. Such talks as that by F. M. Banks, in this issue, are doing much to clear the air and set the stage for later accomplishment. . . . The perennial and troublesome problem of what to do about the gas house heating load is being attacked with renewed vigor. Mr. Loebell's able analysis is another "must" for the industry's policy-makers. . . . Gas shows new vitality in pushing the CP range campaign, tying up with such pacemakers as the glass "kitchen of tomorrow," and in studying college gas equipment (see Mr. LeMay's article). . . . Mr. Beebee speaks up for the superiority of gas in the kitchen and Mr. Cone marshalls the industry's war record in predicting bright "new horizons for industrial gas."

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No April showers here but General Mud operating on the Home Front! Picture shows crew from Lone Star Gas Company repairing a big gas leak at the southwest edge of Wynnewood, Oklahoma. Despite coffer dam, water constantly seeped into crater and it was necessary for crews to keep bailing while digging bell hole and making repairs. This striking action photo was taken by Paul D. Cravens of the Lone Star Gas Company, Dallas.

American Gas Association MONTHLY

JAMES M. BEALL, *Editor*

HOUSE HEATING
. . . The Approaching Importance of This Gas Market

By HENRY O. LOEBELL

Chairman, A. G. A. Subcommittee on Economics of House Heating

I HAVE been asked to discuss with you the approaching importance of the gas house heating load. I have accepted the assignment with pleasure, feeling that perhaps I might be able to present a summary of the elements that must be considered in making policy decisions on this business.

At the outset I wish to amplify a phase of past history which has reflected the gas industry's viewpoints toward the house heating load.

These viewpoints have a bearing on our discussion today.

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The natural gas industry for several decades prior to the 1920s had trouble serving continuously the house heating load. For this reason, the policy generally adapted was to sell gas at very low rates, assume no obligation for continuous service, meet the demand when it could, and expect the customer to make his own arrangements for substitution of standby fuel.

With the advent of new and large discoveries of natural gas in the late '20s, the improved technique of determining depletion and reserves, improved transmission methods, the use of storage and standby equipment, etc., the natural gas supply became stable. Notwithstanding these factors, the attempt to sell natural gas in this period to manufactured gas companies was met with reluctance and resistance. The basis for the reluctance were fears that these longer pipelines would break, that the estimates of reserves were too optimistic, that the house heating load could not be developed, and so on.

In the light of our experience of the last 15 years, these fears have proven groundless. Today I doubt if there are any manufactured gas companies that would not welcome natural gas in their territories.

In the '20s, when house heating was discussed as a desirable load for the manufactured gas industry, the distribution engineers opposed its development because of fear that the peak load would require a new and different type of distribution system. Experience and new knowledge also removed this fear. Today we definitely understand the needs and limitations, as well as the cost, of distribution for the house heating load, and we are able to cope with it. Incidentally, we do not need new distribution systems, as the subsequent work of distribution engineers has proven.

At present the greatest reluctance to the house heating load in the manufactured gas industry comes from production men who, with the tools they now have, fear that the fixed charges of new facilities dedicated to this service alone cannot be met with current rates.

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All these fears in the past were largely mental hazards to the industry. New fears remain mental hazards today. To remove them requires, first: that they be reduced to definite problems; and second: that a solution to these problems be courageously sought.

Therefore I would like to have you consider with me the status of the industry today relative to the house heating load and identify the problems that still exist. Our purpose is to develop a direction for solution of these problems in an endeavor to make house heating a universal service of the gas industry.

Since the gas industry includes many different types of service companies—those supplying manufactured gas, mixed manufactured and natural gas, straight natural gas, etc., and since the problems in localities having different types of service are not identical, I shall limit my discussion to the approaching importance of the house heating load to the straight manufactured gas companies.

Presented at Eighteenth Annual Business Conference, The New England Gas Association, Boston, Mass., March 23, 1944.

The projection into the future of any problem that has a background of experience is not complete without some scrutiny of the previous status. Hence we should first consider our accomplishment to date.

The Statistical Evidence

The amount of house heating load now served by the manufactured gas companies is very small. The statistical information readily available, excluding commercial and industrial loads, includes the sales of house heating gas by companies serving mixed manufactured and natural gas. Therefore the sales reflect larger percentages of house heating customers than are available in the strictly manufactured gas territories. But, even including these more advantageously situated companies in house heating, the total saturation was still only 3.6% of the total number of domestic customers at the end of 1942.

The same statistics show that consumption per average domestic customer using gas house heating is ten times as great as that of the average domestic customer not using gas for house heating. By computation we can also deduce that the gross income per average MCF sold for straight domestic service without house heating is more than twice that of the average domestic customer using house heating.

So our picture at the end of 1942 was about as follows: 3.6% of our domestic customers used house heating. They consumed approximately 36% of all the domestic gas and brought in approximately 16.1% of the total domestic revenue.

Including their use of gas for cooking, water heating and refrigeration, these house heating customers have a calculated yearly load factor of 31.2%, while the straight domestic load customers have a calculated load factor of 81%.

Hence the maximum day demand created by our 3.6% of house heating customers represents 48.6% of the total domestic demand on the peak day, while the 96.4% of straight domestic customers represents 51.4% of the total domestic demand.*

These statistical facts reflect both the cause and the results. The low load factor makes the house heating load costlier to supply. Competition demands lower rates, and lower rates show less profit. For these reasons the effort to secure this load has been limited, the results meagre, and the business generally regarded as fill-in when no other markets were available and unused plant capacity existed.

To be sure, the house heating load has always been attractive because of the large potential load. Nevertheless, because of the factors I've just mentioned, little effort was directed to this business, except in certain advantageous localities or because of more venturesome management.

Hence, looking at the past for guidance to interpret our future position, we are confronted with the problem of whether the position that the manufactured gas industry has taken, namely of supplying the domestic demand with very little house heating, can be continued; or, whether the surge of innovation after the war, which will bring in its wake new competition and new opportunities, requires a reorientation of our business policies. Since these matters are of vital importance, we must discuss them frankly and adequately.

The Change in Markets

Neither the gas business nor any other business is ever static. Business is always fluid. There are always changes; we are all affected by new trends, new competition, new developments. Any industry that does not continually readjust itself to these factors may find itself in time without adequate market.

What is happening now that can be construed as affecting the status of the manufactured gas business? What are the changes in the offing that we sense will affect the gas industry's welfare?

We know that right now, during the war, we are of necessity marking time so far as serving any new wants of the civil population is concerned. Nevertheless, it is a part of good judgment to interpret the signs that exist in a realistic manner and prepare for the things to come.

Two important changes that affect our business are looming on the horizon:

1. The competition directed to our domestic load;
2. The public interest in automatic house heating.

It would be rather shortsighted to ignore the impending competition from the electric industry.

Electric Inroads

We know that the electric industry in the decade prior to the war made inroads on our domestic business. Notwithstanding the fact that it was a period in which the country passed through a serious depression, the progress that the electric industry made was substantial. Forty-three million, fourteen thousand and three hundred sixty-seven electric appliances devoted to auxiliary cooking alone were sold in the decade, at a total retail value of $228,026,980. This, coupled with electric range sales in the period of 2,346,000, at a total retail value of $325,768,140, represents more than a half billion dollars worth of merchandise that affect the cooking load alone. To be sure, these appliances did not all displace gas, nor can we attribute all the reduction in the domestic load in the last decade to this cause. Nevertheless, this past progress made by our electric competitors in a relatively new field has been most encouraging to them.

Regardless of the excellence of the gas equipment and its functional value, and regardless of the relative economic merits of the two services, electricity will appeal to a certain group of people because of its inherent characteristics. This factor, combined with the intent and pressure of a well-organized and well-financed group of industries to enter the domestic cooking and water heating market, represents too formidable a force for the gas industry to arrest completely.

Hence we must realize that we have an impending serious competition to face. To arrest it to any degree will incur expense—expense without compensating income. The weakness in that picture is that having occupied this market, we cannot expect new

* Based upon A. G. A. figures, 1942. The straight domestic load factor was computed on a basis that the peak day is 15% greater than the average day of the coldest month, resulting in 81% load factor. The domestic consumption for house heating customers was figured on a basis of 12 times the average for the months of June, July, August and September, applying to that volume 81% load factor, and for the balance of gas used 27.4% load factor, giving a weighted average load factor of 31.2% for all gas used by house heating customers.

revenues from that source, except as additions to the existing load can be secured. Generally, the people who will be first approached by our competitors will be those in the better class homes and in new homes. The first group most likely have complete domestic service now and are our most valuable customers. Apart from new equipment we may offer them to improve the service they now receive, our earnings would not improve. For the second group of new customers, our opportunity to sell all the domestic services has in the recent past been reduced if no house heating is offered. In the future, with more serious and more determined competition, our results are likely to be even less successful under the same conditions. For these reasons, new house heating loads become a vital instrumentality to nullify competition.

And further, there is a psychological need to secure greater interest from the public for gas service *that is a new service*, a service the public wants and needs. Such a service cannot be other than house heating.

I know you all agree that gas house heating is a great adjunct to our business. I know you hope that some means can be found whereby this service could be made universally available. In order to present my viewpoints on this subject, I shall discuss it first as the public views it; second, as the industry must view it.

The Customer's Viewpoint

The public wants safe, clean, effortless heating methods. This of necessity means automatic heating, where gas fits admirably.

The evidence of this desire is strongly reflected in the precentage of new homes built in recent years that have automatic heating, and also in the experiences of speculative builders and contractors with homes of low cost in which automatic heating had to be provided because they are the only homes that can be readily sold.

The statistical evidence in support of this view on consumer wants is adequate. Hence we can conclude that automatic home heating is here to stay, and that it will become the most accepted method of home heating in the future.

The trend of public wants is toward small homes, compact, insulated, servantless. In such homes the volume of gas required for heating is low, and the cost is relatively low in dollars. People with experience in fuel costs will pay a substantial premium in per cent when the total cost is not out of line with their experience and, consequently, within their budget for heating.

The public will have more spendable income.

If the postwar economy of full employment, which is generally regarded as necessary to the economic survival of the country, is achieved even in part, more people than in the past will have a surplus with which to buy premium fuel. The public has already given the gas industry an index of what premium it is willing to pay.

Surveys on the evaluation of automatic gas house heating in many communities show that the public's evaluation of gas house heating service over and above solid fuel cost allows a premium of from $50 to $90 per year, depending on the quality of the community. This value is assigned by the public for the benefits that gas house heating gives and for the nuisance and labor it eliminates. Hence, without competition from other automatic heating methods, and on a basis that the public has the money to pay for the service, we can assume that gas commands a premium of at least $50 per year above coal cost.

Effect on the Industry

As a by-product, but nevertheless as a part of, and because of, the house heating load, two additional advantages accrue to the gas industry from selling gas for house heating purposes.

1. In old homes, a gas house heating customer uses more gas for the purposes of cooking, water heating and refrigeration—probably largely water heating. This increase in domestic sales per customer varies, but it has been definitely established as being between 20 MCF and 25 MCF per year per customer. Furthermore—and this is something that cannot be minimized—the customer becomes less receptive to competitive influences.
2. In new homes, the percentage of competitive appliances installed is substantially smaller when gas house heating service is available.

The experience with oil fuel during the war, and discussion in the public press on the inadequacy of this fuel, has prepared the public psychologically for a change to gas.

These elements augur well for an expanded market for gas house heating and for an opportunity to both retain and gain domestic load.

To be sure, in the house heating market we will have competition, and this competition will be largely from fuel oil and stokers. Even if we never reach the point where our B.t.u. costs are competitive with other fuels, the public desire and the accepted higher quality of service with gas will provide a substantial market.

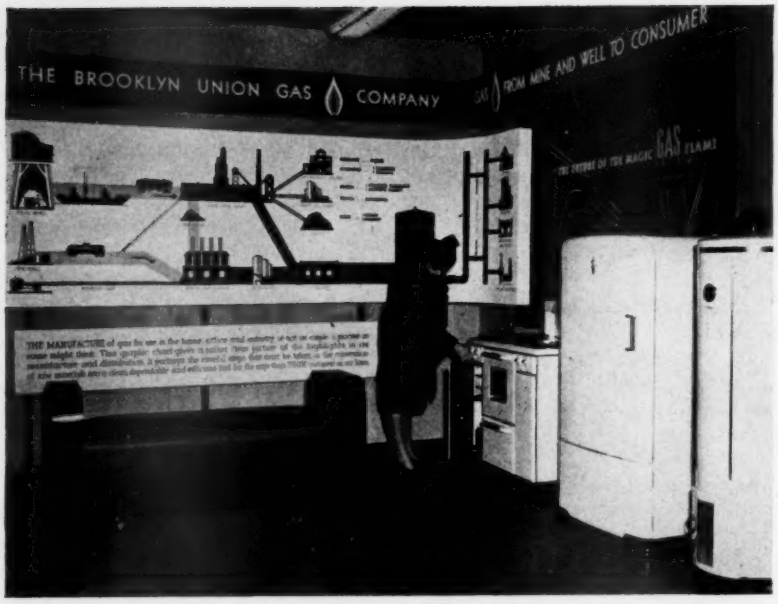
New Business Dilemma

Such a new market may well create a demand greater than the demand that can be met with present facilities. The alternative in such cases is either to refuse the business, which will be embarrassing to say the least, and probably untenable because as a public utility the industry must supply the service; or, to raise the rates in order to make the business meet the cost of new facilities. This latter alternative is also difficult because the old business can be served on existing rates, and the income to the companies thus far does not show inadequate return on the cost of facilities dedicated to public service.

This is a dilemma that may become serious in certain localities and may appear as a consequence of oil rationing, higher oil prices, or scarcity of oil supply.

To summarize, we may conclude that two forces dictate why the gas industry must re-appraise the house heating load in the postwar market:

1. The house heating load provides an opportunity for new earnings because of the load itself and the opportunity for increasing the earnings from old domestic customers, as well as the advantages it offers in new homes for a larger share of domestic services.
2. The house heating load also might



Part of The Brooklyn Union Gas Company's booth in home buyers' exhibit opened in March by the Dime Savings Bank. On display to thousands of visitors are a CP gas range, refrigerator and water heater, and an all-year gas air conditioner is expected to be added soon. On one wall is a drawing of a gas manufacturing plant and distribution system. The drawing shows how gas is made from coal and oil, how it is purified and then distributed

possibly become the only alternative to solvent survival in the future.

If we accept these premises, we cannot afford to lose much time in determining our intent or our policy in entering this market. We cannot afford to wait and see if the competition is going to make inroads, or if the public is going to be receptive. We must declare to ourselves definitely whether these are or are not the facts, or whether the interpretation as to the future is sound, and courageously proceed with the decision to fight this battle, or let nature take its course.

The Gas Industry's Problem

Of course, all this discussion would be pointless were there no hope of being able to serve this load at a profit for the industry.

With the premise in mind that we must develop the house heating loads, let us analyze the opportunity offered by such loads as we may be able to secure with existing facilities, and also what we must do to make economically feasible new facilities for loads greater than our existing facilities can serve.

For this we need a basis of computing the costs that make up the total cost of serving different kinds of customers.

A quick analysis of our costs will disclose that they are made up of three major elements:

1. The customer costs, which vary with the number of customers. House heating does not impose extra costs (except special service).
2. The demand cost, which varies with demand imposed by each type of customer computed on a daily or hourly basis. House heating does impose extra costs because of its high winter demands.
3. The commodity cost, which varies with the volume used by any customer. House heating imposes no extra costs (except as it is desirable to provide costlier enriching materials in order to raise capacities).

We know that if service at a low enough rate could be provided, we could secure all or the major part of the house heating load. We are not in this fortunate position. Nevertheless, our aim is clear. We must secure the greatest possible amount of house heating with rates that are profitable; and we also must aim to reduce our costs so that a greater scope can be given to this business.

Without going into details of these cost elements, and to get to the vital part of our problem, we can state that:

1. Since an average house heating customer buys 10 times the volume of domestic gas as compared with a straight domestic customer, the incremental customer cost remains the same. Hence the volume served for house heating only has no customer cost, save insofar as the cost of servicing the house heating equipment is made a part of this cost.
2. The commodity served for house heating is generally the same as for general distribution; hence house heating gas as such is not higher in cost than the holder cost for any other service (except as mentioned before).
3. Since the facilities required to supply the volume required for house heating are useful only to the equivalent of 27.4% of a year, the demand cost is over three times as great as the cost of facilities that are in use every day in the year.

Thus we have an advantage in customer cost and a disadvantage in demand cost whenever we serve the house heating load. The major facilities that cover the demand costs are plant and distribution.

We have been trying to secure specific data nationally applicable as to what these demand costs are. The Technical Section of the A. G. A. has undertaken these studies and will report to us soon.

In the interim, having identified the problem, we can proceed to find out what we can do about it, first, as a necessary requisite for immediate action and, second, as a guide to the direction in which our improvement must be made for the future.

For Immediate Action

On the assumption that present equipment available is now a part of the total plant cost, any house heating customers served by the existing plant do not involve new demand costs, except, perhaps a larger meter. We can extend our house heating market first by employing the unused capacity of

the facilities available and, in addition, locate the piece of equipment or the facilities in the plant such as blowers, exhausters, coolers, purifiers or whatnot that today are the bottlenecks in maximum plant capacity, and break those bottlenecks so that the capacity of the existing plant is increased to its optimum, particularly for peak days.

The opportunity of using liquefied petroleum gas, high superheated steam, higher static pressures during the make periods, etc., that would increase the capacity of the existing plant, should also be explored.

Of course, to do this adequately we must have a will to do it; we must exert some ingenuity and perhaps venture some innovations.

These and other suggested means of increasing plant capacity are also currently being studied by the Technical Section, from whom we probably will receive more help.

These means will give us the opportunity to start the house heating effort with assurance that there is some plant capacity available.

No Distribution Deficiency

So far as distribution is concerned, studies made thus far do not show any serious deficiency in distribution capacity. In fact, it is the judgment of prominent distribution engineers that existing distribution systems are generally ample up to as high as 20% house heating saturation; also, that by changing some of the systems to intermediate pressure, ample capacities can be secured for maximum house heating service. To be sure, every distribution system may have some weak spots but, generally, they are not hard to correct.

The question of rates must be considered. They are vital to the industry and they are vital to the development of this new business. We are all aware that the cost of raw materials and labor has gone up, although they have been at least in part counteracted by increased loads. We may expect that these higher costs will continue after the war, so we must review our costs in the light of these increases. Since we cannot easily raise the rates now to compensate for this increased cost, it would be advantageous, if feasible, to wait until after the war to make any

(Continued on page 181)

West Coast Technical Conference on Domestic Gas Research Scores Hit

MORE than 200 Pacific Coast gas equipment manufacturing concerns and gas utility companies were represented by their executives, engineers and technicians at the two-day West Coast Technical Conference on Domestic Gas Research at the Ambassador Hotel, Los Angeles, March 15 and 16.

The first meeting of its kind ever held in this area, the conference was highly successful and was sponsored jointly by the Committee on Domestic Gas Research of the American Gas Association, the Manufacturers Section and the Postwar Appliance Committee, a subcommittee of the Committee for Gas Industry Development of the Pacific Coast Gas Association. Technical data presented at the conference were identical to that of the conference held in Cleveland February 17 and 18.

Eugene D. Milener, secretary of the A. G. A. Committee on Domestic Gas Research, opened the Los Angeles Conference; then introduced W. M. Jacobs, manager of general sales, Southern California Gas Company, and chairman of the P.C.G.A. Postwar Appliance Committee, who presided at the Wednesday morning session. After an address by Harry L. Masser, executive vice-president, Southern California Gas Company, and chairman of the P.C.G.A. Committee for Industry Development, on the necessity for immediate development of new and improved features for gas appliances, technical papers on gas burner design and noise and heat transfer factors were presented by F. A. Allen, A. A. Jacquot and W. R. Teller of the A. G. A. Testing Laboratories.

Arthur F. Bridge, vice-president and general manager, Southern Counties Gas Company, and past president of the A. G. A., presided at the luncheon which followed the morning session. F. M. Banks, vice-president of the Southern California Gas Company and vice-chairman of the A. G. A. Committee on Domestic Gas Research, was the principal speaker. The complete text of his address is found elsewhere in this issue.

Mr. Milener presided at the afternoon session which was addressed by Director R. M. Conner, F. A. Allen and K. R. Knapp of the Association's Laboratories staff on practical phases of gas cooking and water heating research.

Additional papers covering design and performance features of gas burners and gas water heaters were presented by Messrs. Conner, Knapp and Teller at the Thursday morning session. H. W. Geyer, utilization engineer of the Southern Counties Gas Company and member of the Technical Advisory Subcommittee for Gas Water Heating Research, acted as chairman.

E. L. Payne, vice-president and general manager of the Payne Furnace & Supply Company and president of the P.C.G.A., presided at the Thursday luncheon. He introduced as first speaker Mr. Conner, who spoke briefly on the part taken by the Laboratories in the research program, after which A. H. Sutton, chairman, Manufacturers Section, P.C.G.A. addressed the meeting on the manufacturers' responsibility in the conduct of appliance research and development.

Three parallel panel sessions took place after the luncheon, which dealt with the problem of translating and applying fundamental research data to help in producing better gas appliances.

The Pacific Coast Branch of the Laboratories was opened to the conference group on Friday morning and was well attended throughout the day.

Eugene D. Milener (left), New York, W. M. Jacobs and A. H. Sutton, of Los Angeles, checking the day's program at the conference

Portion of speakers' table at Wednesday luncheon at which A. G. A. Past President A. F. Bridge presided. Next to Mr. Bridge are P.C.G.A. President E. L. Payne, Beverly Hills, and R. M. Conner, Cleveland

Portable Equipment . . . *for Measuring Properties of Fluids from Gas-Condensate Wells*

By KENNETH EILERTS[1] and others[2]

THE Bureau of Mines, at the request of the Petroleum Administration for War, is determining available reserves of aviation-gasoline stocks and process raw materials contained in various gas-condensate reservoirs. The assignment involves: First, the evaluation of the reserve of hydrocarbon components in gas-condensate reservoirs that are needed in the war, and second, the determination of significant data that will aid in the efficient recovery of those components from such underground accumulations. The technical procedure contributing to the solution of the assigned problems involves the measurement of the relative volumes and compositions (at equilibrium) of the liquid and gas phases of the fluid produced by gas-condensate wells over the complete range of pressures and temperatures to which the fluid is subjected when flowing from the reservoir to the wellhead and through surface equipment to tank storage.

Equipment used recently in testing fluid from a gas-condensate reservoir in the East Texas area appears in Figure 1. The well tested is in the background and not readily distinguishable, but the first- and second-stage gas-liquid separators and accessory equipment for controlling the flow of fluid withdrawn from the reservoir by means of the well are shown at the left. Small-scale equipment, substantially identical to the field equipment in operating principle, is housed in the larger of the two trucks appearing in the background. While the tests were in progress the well was flowing 4 million cubic feet of gas per day through the separators and into a pipe line, and at the same time a fraction of 1.0 per cent of this quantity of gas was withdrawn from the fluid stream at the wellhead and passed through the truck-mounted apparatus for test purposes.

Much of the special apparatus used for determining the properties of fluid from gas-condensate reservoirs is mounted in a special 19-foot body on a 2½-ton truck chassis. (See Figure 2, where the truck containing permanently mounted test equipment is shown at the left.) A separator or accumulator for measuring liquid:gas ratio, a pump for raising fluid pressures within the accumulator above wellhead pressures, and a fractionating column for determining composition of the phases prepared in the accumulator constitute the principal items of portable equipment contained in the truck. A boiler to provide steam for maintaining oil baths at elevated temperatures and an engine and generators housed in fire-resistant compartments within the truck body supply power and electricity for making the tests.

The tent shown in Figures 1 and 2 shelters unmounted apparatus, miscellaneous supplies, and equipment, and provides a "roof" under which the experimental data taken 24 hours a day can be compiled.

The space inside the truck body where the experimental work is done is 7½ feet wide, 15 feet long, and 7 feet high. An interior view of the front end of the operating compartment is shown in Figure 3. The centrifugal pump on the floor to the right of the instrument panel returns steam condensate to the boiler under pressures up to 150 psi. The steam boiler cannot be seen in Figure 3, as it is mounted in a closed compartment behind the instrument panel and is accessible only through an exterior door on the left side of the truck. The elec-

Figure 1. Equipment for flowing and testing a gas-condensate well

[1] Physical Chemist, Bureau of Mines, Bartlesville, Okla.

[2] The equipment was assembled under the general supervision of R. A. Cattell, H. C. Fowler, N. A. C. Smith and R. E. Heithecker of the Bureau of Mines. Others of the Bureau of Mines who gave all or part of their time to the design, construction and operation of the equipment are V. L. Barr, H. A. Carlson, H. M. Harris, C. V. Mooney, B. Mullens, J. A. Saffell, R. V. Smith, G. B. Spencer and F. P. Vance. Especial credit is due F. G. Mueller and J. O. Greenwalt, instrument makers of the Bureau of Mines Petroleum Experiment Station, Bartlesville, Okla., for constructing much of the special equipment that could not be purchased. The assistance of H. Cramer, E. Daniel, H. C. Miller and J. A. Rinehart in the preparation of illustrations and manuscript is gratefully acknowledged. The Natural Gas Department of the American Gas Association has cooperated on technical parts of the work.

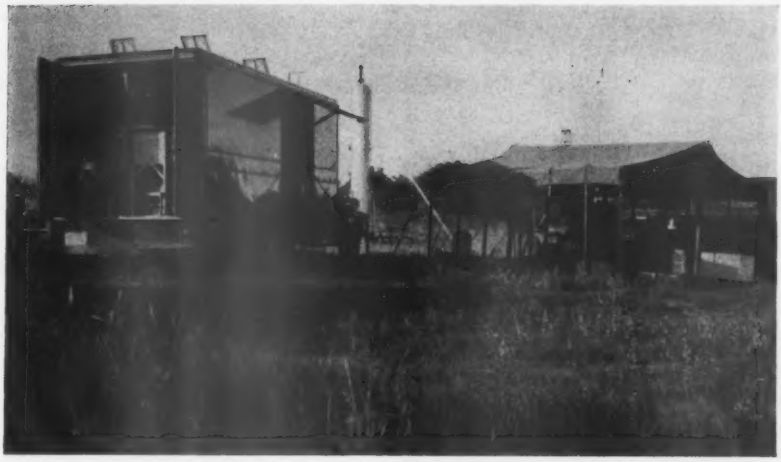


Figure 2. Portable equipment set up at a gas-condensate well

tric generators and gas engine provide power for all purposes except for driving the high-pressure pump; they may be seen in Figure 3 through the open door of the front-end compartment. A drive shaft for transmitting engine power extends the full length of the operating compartment and is mounted under the walkway shown in front of the door. The engine in the right foreground of the photograph drives the high-pressure pump. Natural gas from the field separator is provided at the proper pressures by means of the regulators installed above the centrifugal pump for use as fuel in the boiler and engines and to actuate various diaphragm valves used in the test equipment.

Figure 4 is an interior view of the rear end of the operating compartment. The two-cylinder high-pressure pump is shown shielded by an expanded metal guard. A piston-gage and pilot-valve assembly for controlling pressures on the accumulator is back of the pump between it and the accumulator and interchanger baths. The high-pressure accumulator is mounted in an oil bath in front of the gage panel. Heat interchangers mounted in two oil baths behind the gage panel control the temperature of the gas-condensate fluid flowing into the accumulator and serve to prevent trouble from formation of hydrates in the throttling valves used. The steam manifold is below the gage panel, and the diaphragm and solenoid steam valves employed for controlling temperatures in the three baths are mounted behind the panel.

The all-metal fractionating-column assembly employed in analyzing samples of gas and liquid hydrocarbons cannot be seen in either Figure 3 or 4, as it is mounted along the right side wall of the operating compartment. Figure 5 is a view through an open side door in the truck body of the two ceiling-height columns and the manometer manifold used in controlling distillation pressure in the columns. The columns are constructed to withstand pressures up to 1,000 psi., are cork-insulated and for most operations are refrigerated with solid carbon dioxide or ice.

A schematic assembly of the portable equipment for testing fluids flowing from gas condensate wells is given in Figure 6. The assembly is similar to the full-scale equipment used in operating gas-condensate wells in that it includes a flow line 2 from the wellhead, a flow-rate control valve 7, a high-pressure accumulator 9, a back-pressure regulating valve 20, a low-pressure accumulator 22, and a gas meter 23. The test equipment is constructed to be used on wells flowing through standard surface equipment from which 1 per cent or less of the flow stream is diverted for testing in the portable equipment by means of sampling nozzle 1 installed in the wellhead or at other suitable sampling point.

When the test equipment is operated at the pressure and temperature of the field separator, it is important that the liquid:gas ratio of the fluid in the high-pressure accumulator be the same as the liquid:gas ratio measured simultaneously with the full-scale equipment. The rate of flow of fluid through the sampling nozzle found to provide a liquid:gas ratio in the partial flow equipment identical with the liquid:gas ratio in the field separator operating at the same pressure and temperature is the flow rate maintained during subsequent tests at other accumulator pressures and temperatures. The rate at which the well fluid is allowed to flow through the test equipment is controlled by throttling valve 7 or, when pump 4 is used, by adjustment of the length of the piston stroke. The rate of flow is indicated by critical flow meter 23 designed for operating at pressures up to 1,000 psi. and embodying details described by Rawlins and Schellhardt.[3]

Liquid:gas ratios at greater than wellhead pressures are obtained with the aid of pump 4; the sample of fluid from the wellhead enters the pump at approximately wellhead pressure and is compressed to higher pressures as required in accumulator 9.

Pump 4 has two $\frac{5}{8}$-in. pistons; it will displace 2.1 cu.ft. of fluid per hr. under a pressure of 7,200 psi. and 3.3 cu.ft. per hr. at a pressure of 4,600 psi. In common terms of gas measurement the pump will provide flow rates of 1,000 cu.ft. of gas per hr. in tests on gas-condensate wells having wellhead

Figure 3. Power equipment installed in front end of truck body

[3] Rawlins, E. L. and Schellhardt, M. A., Back-Pressure Data on Natural-Gas Wells and Their Application to Production Practices: Bureau of Mines Monograph 7, 1936, p. 117.

Figure 4. High pressure pump and liquid accumulator installed in rear end of truck

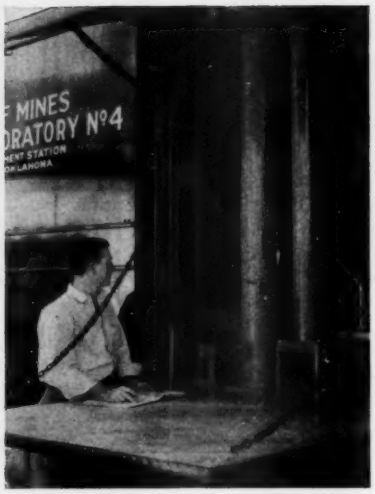


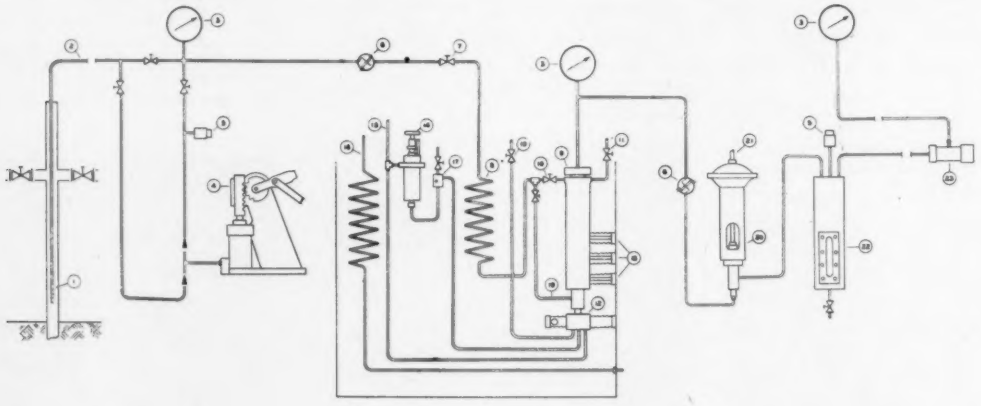
Figure 5. Fractionating column assembly, viewed through an open side door of truck

pressures above 4,000 psi. The capacity of the pump is proportionately less if the fluid from the wellhead enters it at lower pressures.

High-pressure accumulator 9 is designed to separate the phases of flowing fluid at constant temperature and pressure and to serve as a reservoir where definite volumes of the liquid phase may accumulate in accurately measurable periods of time. The fluid enters the accumulator through an opening in the side near the top and moves downward through baffles arranged to cause continuous drainage of the liquid into the measuring compartment at the bottom of the accumulator. The dry gas moves vertically through a central passage in the accumulator and is conducted through back-pressure-regulating valve 20. As the accumulator fills with condensate one of the liquid meniscus valves 13 is opened and the transparent jet of gas escaping from the valve while the liquid level is rising to the position of the valve location becomes a white spray when liquid is ejected through the valve with gas.

The separation of the phases of gas-condensate fluids at reservoir pressures, or pressures near the dew point where liquid:gas ratios are relatively low, involves slow rates of accumulation, and excessively long periods are required to measure the accumulated liquid if the liquid meniscus-indicating valves are used. Consequently glass window 12 is used in measuring low rates of liquid accumulation and in observing phenomena that cannot readily be studied in any other way. The window is designed on the basis of a principle discovered by Poulter[4] and has been tested under pressures up to 6,000 psi. at 32° and 280° F. In service the window has withstood the pressures required without breakage or leakage of gas-condensate fluid. The assembly is essentially a window in either end of a hollow steel cylinder connected

[4] Poulter, Thos. C., Apparatus for Optical Studies at High Pressure: Physical Review, Vol. 40, No. 5, June 1, 1942, pp. 860-871.



1 SAMPLING NOZZLE
2 TUBING CONNECTION, WELL TO TRUCK
3 PRESSURE GAGE
4 MOTOR DRIVEN FLUID PUMP, CAPACITY 7,200 PSI
5 DIAPHRAGM SAFETY HEAD
6 HEAT INTERCHANGER
7 FLOW RATE CONTROL VALVE
8 TEMPERATURE STABILIZATION COIL
9 HIGH PRESSURE ACCUMULATOR
10 LIQUID DISCHARGE VALVE
11 GAS SAMPLING OUTLET
12 GLASS WINDOW FOR HIGH PRESSURES
13 LIQUID MENISCUS INDICATING VALVES
14 LIQUID VOLUME METER
15 PISTON GAGE CONNECTION
16 STEAM COIL FOR BATH TEMPERATURE CONTROL
17 MERCURY TRAP
18 VALVE
19 FLUID INJECTOR CONNECTION
20 BACK PRESSURE REGULATING VALVE
21 CONNECTION TO PISTON GAGE PILOT VALVE
22 LOW PRESSURE ACCUMULATOR WITH GAGE GLASS
23 CRITICAL FLOW GAS METER

FIGURE 6 - SCHEMATIC ASSEMBLY OF PORTABLE EQUIPMENT FOR TESTING FLUID FLOWING FROM GAS-CONDENSATE WELLS

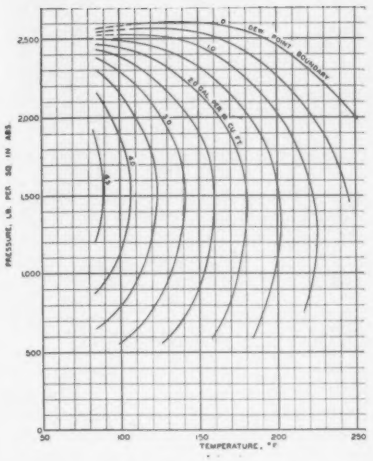


Figure 7. Phase relations of flowing fluid

to the bottom of the accumulator; when one window is illuminated the material in the cylinder may be observed through the opposite window.

A liquid meniscus may be maintained in the accumulator at the level of the window by withdrawing liquid from the accumulator under the volumetric control afforded by liquid-volume meter 14. The meter is used in conjunction with a piston gage and is connected to the bottom of the high-pressure window through a mercury-filled U-tube, a mercury trap 17 and a steel tube from the trap to the window. When oil is withdrawn from the liquid-volume meter by means of a screw on the piston gage, mercury flows into the meter from trap 17. Thus connate water and condensate from the window and steel connecting tube flow into the mercury trap, and the meniscus of condensate in the accumulator is lowered to a reference level on the high-pressure window.

To facilitate the identification of a liquid or vapor phase in front of the window when there is no visible meniscus, a sample of the fluid entering the accumulator is caused to pass the window; then, if a liquid phase is present in the accumulator, gas bubbles are observed. If a gas phase is present, drops of liquid will be seen. Valve 18 is closed just enough to cause part of the fluid to enter the accumulator by way of steel tube 19. An extension of the tube inside the accumulator projects downward and has an open end inside the aperture of the high-pressure window.

The procedure used in determining the dew point of the flowing fluid at a given temperature is to measure liquid:gas ratios, near the dew-point boundary, at pressures increasing in 25-psi. increments until a liquid phase no longer is precipitated in the accumulator. The pressure at which the accumulator is operated then is decreased in 25-psi. increments until a liquid phase reappears and liquid:gas ratios can be measured. The average of the pressures at which the liquid phase disappears and reappears as observed through the high-pressure window is considered to be the dew-point pressure of the flowing fluid at the temperature in the accumulator.

The flow-test equipment is tested regularly under a pressure of 5,000 psi. and has been found satisfactory in the determination of dew points at temperatures ranging from 70° to 250° F. The piston-gage pilot-valve assembly permits regulating pressures within accumulator 9 when flow rates are as low as 350 cu.ft. per hr.

The type of data obtained with the portable equipment is illustrated in Figures 7 and 8; experimental data are plotted in Figure 8, and the phase diagram obtained from the data is shown in Figure 7.

The relation between phase diagrams of the type illustrated in Figures 7 and 8 has been shown in detail by the writer in a discussion of a paper prepared by Reid.[5] Briefly the dew-point boundary shown in Figure 7 is obtained from the points of intersection of the isotherms of Figure 8 with its pressure axis. The maximum pressure on the dew-point boundary (Figure 7) is the cricondenbar. If, for example, a flow test has been made at an accumulator temperature of 280° F. and the results are used to extend the dew-point boundary curve of Figure 7 to higher temperatures, a maximum temperature point in the curve probably would be defined; this would be the cricondentherm. The common point to which all the curves of Figure 7 appear to be directed in the high-pressure, low-temperature range is the critical pressure and temperature of the flowing fluid.

Referring to Figure 7, the dew-point boundary shows the minimum pressures at indicated temperatures at which the flowing, gas-condensate fluid could be maintained in a single phase. If, for example, the reservoir temperature was 200° F. the pressure in the reservoir would have to be maintained at 2,460 psia. or higher to prevent the

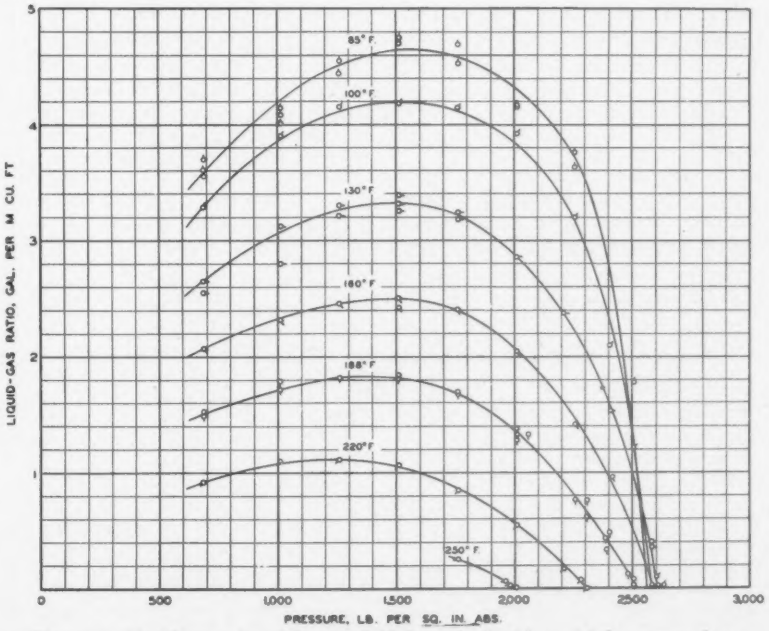


Figure 8. Liquid-gas ratios of flowing fluid determined with partial flow accumulator

[5] Reid, Lawrence S., Some Factors Influencing Recovery of Condensate in Recycling Operations: American Institute of Mining and Metallurgical Engineers Petroleum Technology Pub. 1259, Nov. 1940, p. 7.

precipitation and possible loss of a valuable liquid in the pores of the reservoir formation. The volume of liquid which will form if the reservoir pressure is allowed to decline to a pressure of 2,270 psia. will be 0.5 gal. per 1,000 cu.ft. of separator gas; at a pressure of 2,030 psia., 1.0 gal. of liquid will form per 1,000 cu.ft. of separator gas. The liquid phase at such pressures is analyzed in the field with the all-metal fractionating column to determine what part of the total indicated volume is represented by butanes and heavier components. These analytical data plus a laboratory analysis of gas and liquid samples of the flowing fluid from the separator provide information required for estimating the hydrocarbon reserve in the reservoir.

In actual practice the plant process used for recovering heavy hydrocarbons from the flowing fluid before the denuded gas is returned to the reservoir usually involves relatively low temperatures. If the flowing fluid passes through an extraction plant without coming in contact with an absorbing fluid or diluent, the phase relations indicated at the low temperatures in Figure 7 will apply. However, when a liquid absorbent is used so that the system involved differs appreciably from that of the flowing fluid, the low-temperature phase relations of Figure 7 will not apply. If, however, the absorbent is a material that closely resembles the composition of the condensate being recovered, Eilerts and Smith[6] show that admixture of separator liquid has the effect of increasing the dew-point pressures and, with reference to Figure 7, would have the general effect of shifting the curves uniformly upward and to the right so that at a given pressure and temperature the liquid:gas ratio is increased. The low-temperature data in Figure 7 are obtained to facilitate the design and control of liquid-recovery and gas-cycling equipment.

[6] Eilerts, Kenneth and Smith, R. Vincent, Specific Volumes and Phase-Boundary Properties of Separator-Gas and Liquid-Hydrocarbon Mixtures: Bureau of Mines Report of Investigations 3642, April 1942, Figure 16, p. 38.

Feminine Influence

To save the girl collectors having to carry about heavy bags of coppers, Wandsworth Gas Company (England) is converting most of its penny slot meters to take shillings. About 30,000 meters will be altered.

Natural Gas Spring Conference May 11-13 at French Lick

THE Natural Gas Department, American Gas Association, has planned a conference to be held at French Lick Springs Hotel, French Lick, Indiana, on May 11, 12 and 13.

The program includes two symposiums which will survey important fields of natural gas operation. The first will review modern trends in the storage of natural gas both by liquefaction and by underground storage. Company representatives from all sections of this country and Canada where these operations are in practice today will discuss this subject from the point of view of each company's experience.

It is probable that the following phases of underground storage will be considered: location of storage pools; area covered; name of horizon; depth; original rock pressure; number of active wells; number of input wells; size of tubing; present storage pressure; storage pressure as of December 1, 1943; gas stored underground December 1, 1943; gas now stored underground (May 1, 1944); volume of gas put in under certain pressure conditions; gas that may be withdrawn under certain pressure conditions; horsepower in compressor station required for injecting or extracting gas; and water conditions.

Current experiences in the process of liquefaction and regasification will also be related.

An equally dynamic program will center around the long distance transmission of natural gas to be considered in the second symposium. Companies who have engaged in transmitting gas over some distance will relate their experiences and discuss modern practices employed in pipeline construction and operation, compressor station operation and maintenance, dehydration and related problems.

There will be one general session over which the chairman of the Department and Vice-President of the Association, J. French Robinson, will preside. He will also present the chairman's address. A featured speaker will be Dr. R. R. Sayers, Director of the Bureau of Mines with which the Department has cooperated over a period of years in research studies of mutual interest. Other speakers will be announced at a later date.

Due to a scarcity of rooms, all delegates are urged to make their reservations early.

WPB Approves Plan for Southern California Pipeline

THE War Production Board last month approved plans for the construction of a major pipeline from the La Goleta dry gas field above Santa Barbara to Los Angeles. The project, which will be undertaken by Southern Counties Gas Co., Southern California Gas Co., and the Pacific Lighting Corp., is expected to cost about $4,000,000.

The Pacific Lighting Corp. owns the La Goleta dry gas field, where an underground gas shortage operation of considerable magnitude has been in progress for the past three years. The new pipeline, according to preliminary plans submitted to WPB, will provide a net increase of 164,000,000 cubic feet of gas for peak day use by essential customers in the Los Angeles area.

The plan calls for the construction of a 16-inch line by Southern Counties Gas Co., connecting the La Goleta field with that Company's Ventura compressor plant, a distance of slightly over 36 miles. Southern California Gas Co., as its share of the project, will lay 55 miles of 18-inch pipe and 12 miles of 22-inch pipe, between Ventura and Los Angeles. In addition to these two major jobs, Pacific Lighting proposes to drill four more dry gas wells at La Goleta, revamp the compressor plant there, and install a dehydration plant; while Southern Counties will build a dehydration plant at Ventura, and revamp the compressor station there.

The project, it is explained, will enable the gas companies in Southern California to store large volumes of surplus gas in the natural underground reservoir at La Goleta during the summer months when surplus gas is available, and to utilize this gas to meet peak loads in the wintertime.

Gas in Italy

AS of December 1943 it is said there were 182 gas works in the country with a consumption of 28,946 million cu.ft. as compared with 8,825 million cu.ft. in 1923. The annual consumption per head of population was given as 431 cu.ft. as compared with 7000 in Great Britain and 2860 in Holland.

Fundamental Research . . . *Relationship to Postwar Gas Appliance Development*

By F. M. BANKS*

Vice-Chairman, A. G. A. Committee on Domestic Gas Research

FOR the more than twenty years during which I have been associated with the gas industry we have heard our leaders point out the importance of increasing the amount of research in various phases of our business. During that time, of course, some progress has been made, but probably no one has had cause to be satisfied with its extent. The problem of increasing total research effort has not been easy of solution, nor has it been clear what route should best be followed. The need has been so obvious, however, that the problem of effecting some further rate of progress has interested me keenly. Because of my association with some phases of the work I have been asked to discuss the matter of utilization research.

I do so, not in the capacity of one qualified either as a technician or as an expert in research techniques, but simply as a utility man interested in the long term development of our industry in all of its branches.

F. M. Banks (left) and Harry L. Masser, Los Angeles, inspect one of the exhibits at the West Coast Technical Conference

Kind of Research Needed

The title of this discussion includes the words "Fundamental Research," and that calls for some explanation. You are probably all familiar with the fact that the American Gas Association program limits the research which it conducts at the laboratories to fundamental as distinguished from applied research. During the war an exception has been made in that applied research may be undertaken under certain specified conditions. We have all heard discussions about what research is fundamental and what is applied. It has been my experience that there are almost as many opinions as there are people discussing the subject. What I might define as applied you might consider fundamental, and conversely. Despite all definitions, I am in full accord with the idea that in the long view it is the appliance manufacturers who should do the final applied, or developmental research work. Their interests lie in trade name products, special features and devices, performance characteristics. These they acquire by patent and research, which they can afford to exploit only if their expenditures will produce an income that justifies them over and above the return which will accrue to those manufacturers who do not carry on such development.

Without the necessity for refined definition of fundamental or applied research, I think you will conclude from the material being presented at this conference, that the research work we have done to date is of the sort we should properly be doing currently. Stated in other words, I feel that we need have no present concern that the work we have been doing will result in any impairment of manufacturer interests.

I say this because, only a few years before the war, we all had knowledge of appliances which, good in one or more performance characteristics, were quite poor in others. In fact, not so many years ago we had occasion to get together a group of one type of appliance, consisting of something more than a dozen models and makes. Each appliance of the group excelled in some performance feature and was deficient in others. Judging from the group, it was clearly evident that the industry could produce a composite appliance which could offer performance superior to any such appliance then on the market, but no one did it. In fact, it was our further experience that successor models of the same appliance would frequently not perform excellently in the same features as the former one. Apparently too little was known about what produced good results; too much was left to guess.

Some say we should leave that de-

* Vice-President, Southern California Gas Co., Los Angeles, Calif.

Address before West Coast Technical Conference on Domestic Gas Research, Los Angeles, Calif., March 15 and 16.

gree of difference in performance as a matter for any given manufacturer to worry about. If a manufacturer can sell all he wants to sell of a product, why should he bother to make a better one? I could agree with that conclusion if the reference were similar to the difference between fluid drive and hydro-matic, or to automatic overdrive versus manual, in the automotive field. But in the case of these gas appliances, so many of them were failing of excellent performance in features which would be more nearly analogous to reasonably good carburetion, proper distributor operation, or even to having wheels which were round. That is to say, we had all too many ranges which would broil only fairly well, too many with tempermental oven heat distribution, with low temperatures which were not low, with top burners affording poor turn-down and poor distribution. We also produced water heaters with unstable flame over a fairly wide range of conditions.

And when dealing with the need for improvement in performance features so fundamentally a part of the service which the appliance is meant to render, then I cannot agree that it is the business of the manufacturer alone.

Wartime Research

So much for the period before the war. Then came the war, and its demands upon manufacturers which have resulted in most of them having to set aside all appliance work. And they have done a most splendid job of this war work, as a group. But, where and when was this improving of appliances to be done? Who was to conduct the research needed to tell us how to make our appliances do a better job? The answer came when American Gas Association appropriated more funds for this type of work than ever before.

What is the proper function of American Gas Association research? Is it to provide a "socialized" service so that anyone can take the material thus provided and become a manufacturer? Is it simply a matter of letting American Gas Association spend research dollars so that manufacturers will not have to spend them? If that should be the result, it is my opinion we would be doing a grave disservice to the industry in the long run. This industry, with few large manufacturers, needs alert, able concerns whose interests are "gas" who will undertake their full responsibility in producing increasingly improved appliances. We need to support such manufacturers.

We cannot, however, overlook the fact that the utilities have an enduring investment in this business. It has no other means of selling its services than through the appliances which are offered. They cannot see them fail to keep up with competitive needs.

At this point I should like to quote from a talk made by Frank Adams at the Technical Conference held last month in Cleveland. I do so, first, because I share the high regard in which Mr. Adams is held in our industry, second, because he is widely regarded as spokesman for the manufacturers in matters of this sort, and third, because he states clearly some of the issues germane to this discussion.

Manufacturers' Relationship

Having referred to the peculiar interest which the utilities have in the matter of good appliances, he goes on . . . . "we can examine the interest and proper relationship and need of the manufacturers.

"In doing this, I think there are certain principles which seem to me to be fundamental as a background for any such discussion. There are others that may occur to you than those that I mention, but I have in mind at least four.

1. Gas service can not be sold without appliances. That has been said many times and in many ways and is axiomatic. Leon Ourusoff recently expressed it when he said that gas is not and can not be promoted without a vehicle of promotion. The gas appliance is that vehicle. Not only is it a means of delivering gas service but it determines the type and quality of the service. The gas companies, therefore, have a very direct interest in those conditions which promote the production of good appliances.

"I am not going to discuss here the question of why it is that some utility purchasing agent may be perfectly willing to have you take off everything that you think represents superior quality in your appliance if you will just cut the price a few dollars. That is another question that we need not discuss here.

2. The utilities have the major interest in research necessary to produce competitive appliances.

This is necessarily true if for no other reason than because if the manufacturers do not keep their standards up to competitive appliances, which involves continued research and development to match that done by competitive industries, the utilities must do it. The utilities can never afford to have the vehicle for the delivery and promotion of their service in the home associated with the horse and buggy age in comparison with other household equipment and appliances.

3. The utilities need a sound, loyal manufacturing industry. The gas utilities need loyal appliance manufacturers who have a long term faith in the gas industry and whose major interest and investment is in the field of gas appliances. If the utilities do not want to go in the manufacturing business themselves, then what kind of a manufacturing industry do they want? The answer is self-evident. It is that faith and interest in the gas industry which encourages and justifies research.

4. The development of gas appliances can best be done by the manufacturer.

There is more to research than just the development of a patentable idea. Some of the bright people in Washington have expounded the theory that the only thing standing in the way of wealth and happiness of manufacturers generally and small manufacturers in particular is the monopoly of patents. Enforce sub-licensing and everyone would benefit.

I am reminded of this by a postal card which came to my desk yesterday from the Small Business Association calling attention to the fact that alien patents, *thousands* of them, are now available without any formalities of royalties, territory or sales restrictions, not even the inconvenience of negotiating an agreement—all for $15 per patent. Now these same people are confounded by the fact that nobody seems to care particularly about taking out licenses.

The reason is, of course, that it takes more than just a patent to make a successful business. Taken alone a patent means little. Incorporate in it your experience and relate it to your facilities to make it operative and it acquires real value. Research has to be related sooner or later and should be carried on continuously against the background of production and market experience.

"Now I have stated four of these fundamental principles:

1. Gas service must be promoted in terms of gas appliances.
2. Utilities have the major stake in the development of competitive appliances.
3. Utilities need a sound, loyal manufacturing industry.
4. Appliance research and development can best be done by the manufacturers.

"In the light of these principles, it seems to me the question of applied versus fundamental research begins to lose importance. The real question is, 'What are the most constructive and the best policies for the gas companies to follow to increase research, to make it most effective not only in just pro-

(Continued on page 178)

New Horizons for Industrial Gas

By CARROLL CONE

Development Engineer, Surface Combustion, Toledo, Ohio

ABOUT 28 months ago, we entered the greatest war in history, a war in which the final result may be determined as much by our efficiency in industrial production as by military action. Our ability to tackle and solve the problems of war production came largely from long years of preparation, not for war, but for service in normal industrial markets. The gas industry can be proud that it was one of the few ready to serve when this emergency arrived.

We are living in a period of radical changes. There can be no return to any prior status which we may choose to term "normalcy." We can be sure of only one thing about our business environment in years to come: It will be different. But whatever the shape of the future we can carry with us this one lesson from current experience: By providing our best service for the markets of today, and by preparing through research and development to expand and serve the markets of tomorrow, we shall always be ready to meet the changing pattern of world events.

In applying fuel gas technology to the problems of war production, equipment manufacturers have drawn heavily on prewar experience. Yet many significant developments have been carried through from experiment to application under stress of war necessity, to create entirely new processes and products. In the design of large special furnaces and process equipment, under the urgency of the past few years, it has not been possible to test all unknown factors before construction of the first production unit. Here it has been necessary to integrate past experience into new forms, anticipate possible troubles, make provision for meeting them if they occurred, and then go ahead.

It is a real tribute to the confidence of our customers in the integrity of the furnace manufacturer that in the course of tooling up for war numerous orders have been placed for special furnaces which had no precedent in previous construction. Many of these units represented new limits of size or complexity. With minor exceptions, these essentially experimental furnaces have been carried through to completion under the tightest kind of schedules, have gone into production with minor design adjustments, and have proceeded to do the job they were intended to do, sometimes with unexpected margins of quality or capacity.

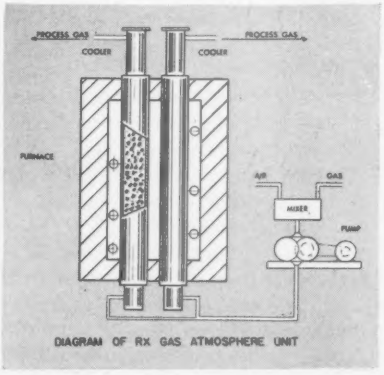


Figure 1. Diagram of RX gas atmosphere unit shows operating principle

Controlled Atmospheres and Radiant Tube Heating

The availability of gas-fired radiant tube heating elements at the beginning of the war production period made possible some spectacular innovations in furnace design. The size of controlled atmosphere furnaces for bright annealing, clean hardening and similar operations was no longer limited by the practical size of heat-resisting alloy muffles.

As a case in point, a series of duplicate furnaces for clean hardening armor plate sections 2″ thick by 5′ wide by 14′ long was constructed in the Detroit area. Each of these furnaces had an inside width of 6′ 3″ and an inside length of 200′. These furnaces were heated with radiant tubes above and below the roller hearth carrying the work, and were provided with a non-oxidizing DX gas atmosphere made by partially burning and conditioning fuel gas. Although these were by far the largest furnaces of this type ever attempted, involving some very novel mechanical problems, they went into production immediately on completion and have turned out a very impressive tonnage of accurately heat-treated armor plate for combat vehicles.

While gas carburizing as a means of face hardening steel parts was in general use before the conversion to war production, the process has been considerably revised and improved in subsequent years. A new type of carburizing atmosphere, permitting more accurate control of case depth and carbon concentration and also increasing life of furnace alloy, together with the necessary equipment for producing this atmosphere, has been developed and placed in commercial operation. The operating principle of the RX type of gas generator which is used to form this special atmosphere is illustrated in Figure 1.

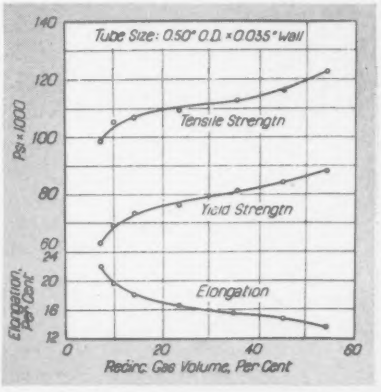


Figure 2. Improvement in physical properties secured with bright gas quenching

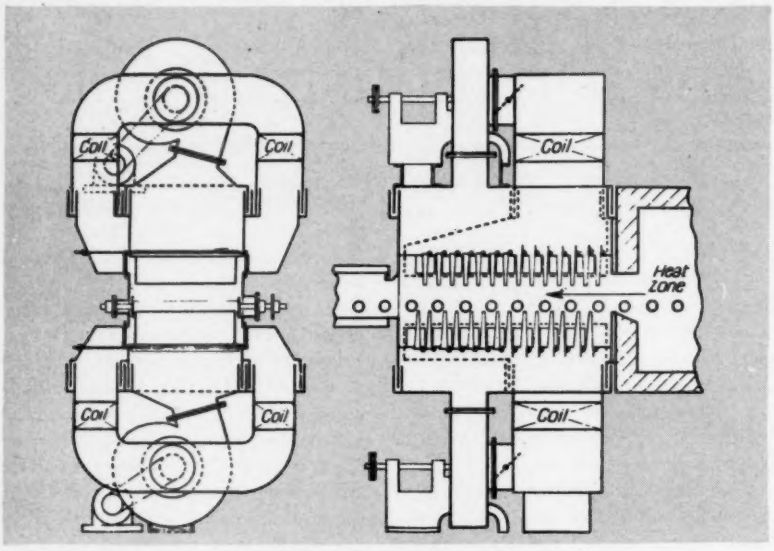
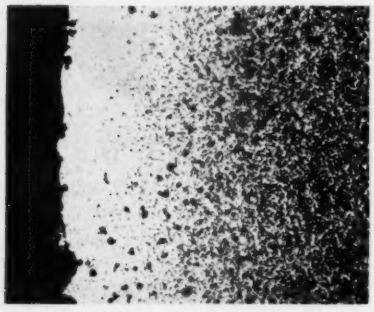


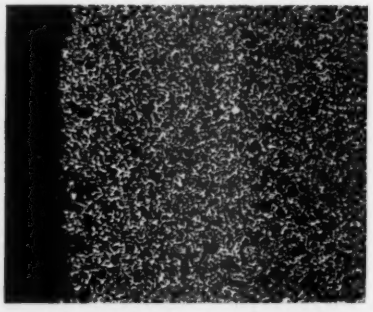
Figure 3. Gas quenching zone as applied to a continuous roller hearth furnace

trated in Figure 3. This shows the jets which direct cold de-oxidizing gas on the work leaving the furnace, and the fans which recirculate this gas through water cooled coils.

It is recognized that the fatigue strength of heat-treated steel parts subject to repeated or alternating stresses is seriously reduced by surface decarburization. Working stresses are ordinarily a maximum at the work surface, and with even slight decarburization the highly stressed skin necessarily has the lowest ultimate strength. Formation of cracks by incipient failure in this skin results in stress concentrations which ultimately cause rupture of the parts. Decarburization has been almost a necessary evil, resulting from treatment in the original manufacture of the steel or from any subsequent heat treatment. The elimination of this weakened layer was therefore of prime importance in designing ordnance, aircraft and combat vehicle parts of minimum weight and maximum strength under repeated stress.



A. As received



B. Recarburized

Figure 4. Photomicrograph illustrating skin recovery by recarburization

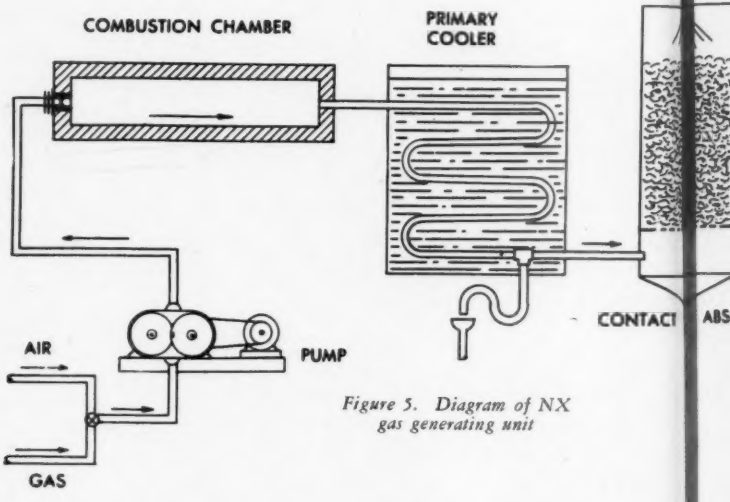


Figure 5. Diagram of NX gas generating unit

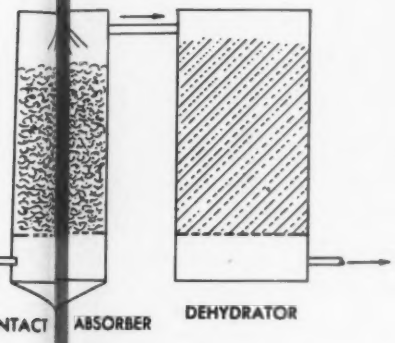
An entirely new process was developed for heat-treating steel parts without surface oxidation, in cycles requiring relatively fast cooling from furnace temperature to some predetermined lower temperature. This involves the use of high velocity jets of non-oxidizing gas at low temperature, which impinge upon the work coming from the furnace, giving cooling rates formerly believed possible only with liquid quenching. This process is now in use for heat-treating aircraft tubing. Figure 2 shows typical results of the treatment. Here physical properties are plotted as a function of the ratio of recirculated cooling gas volume to the total available volume. Increasing the relative volume of recirculated cold gas, of course, increases effective cooling rate.

The bright gas-quenching mechanism as applied to a typical roller hearth heat-treating furnace is illus-

It has been found possible to completely restore the carbon concentration of a decarburized skin, without carburizing adjacent machined surfaces which may have no decarburized layer, by heating in contact with an atmosphere in equilibrium with the desired carbon concentration. This heating is ordinarily accomplished as part of a heat-treating operation, as

before final quenching, so that no additional processing is required. A typical application of this recarburization or "skin recovery" treatment is in the conditioning of heat-treated steel springs for maximum resistance to fatigue stresses.

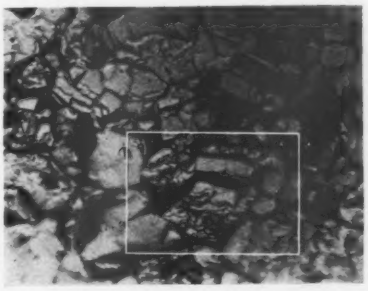
To illustrate the precision results which can be secured with the skin recovery treatment, photomicrographs comparing the surface of a forging before and after treatment are shown in Figure 4. In Photograph A, the lighter areas to the left indicate a depleted carbon concentration at the original surface of the forging. Photograph B shows a corresponding portion of the surface after recarburizing in connection with a subsequent heat treatment. It will be noted that the grain structure and correspondingly



the carbon concentration is entirely uniform from the surface on in.

A parallel development has provided an atmosphere for use in the spheroidizing anneal of high carbon steels. Cycles used for such annealing are relatively long and with ordinary non-oxidizing atmospheres, surface decarburization results. For many products this is extremely undesirable but any increase in surface carbon content would be equally unsatisfactory. Atmospheres developed for this work have a very low concentration of active carburizing or decarburizing ingredients, so that they remain in substantial equilibrium with the desired carbon concentration over a considerable range of temperature. Such atmospheres are made by burning fuel gas with nearly the full complement of air, then removing the water vapor and the carbon dioxide by condensation and absorption.

Figure 5 shows the flow diagram of the NX type of gas atmosphere preparation unit in which a controlled atmosphere consisting mostly of nitrogen with small percentages of carbon monoxide and hydrogen is prepared. The air-gas mixture is accurately proportioned and burned in the combustion chamber. Most of the resulting water vapor is removed in the primary cooler. Carbon dioxide is absorbed in the contact absorber tower,



Replica of acid pickled steel x 970

Replica of gas pickled steel x 970. Focal plane 5 microns from crystal faces

Rectangular area of above x 1945

Figure 6. Surface secured by pickling steel in acid solution

Replica of gas pickled steel x 970. Focal plane in plane of crystal faces

Figure 7. Surface secured by gas pickling steel

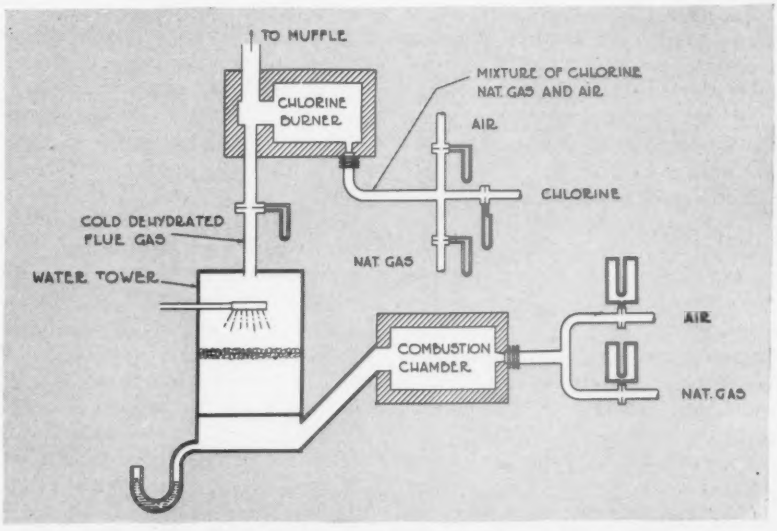


Figure 8. Schematic diagram of gas pickling atmosphere producer

after which the residual water vapor is removed in a dehydrating unit. By varying the initial air-gas ratio, the final composition can be adjusted to be in equilibrium with the carbon in the work and the furnace temperature over a considerable range. It is obviously possible by complete combustion of the fuel gas to use the same type of unit for manufacturing substantially pure nitrogen.

Perhaps one of the most spectacular applications of controlled atmospheres has been to reduce or eliminate formation of oxide scale in the heating of steel parts for forging. It had previously been accepted that a heavy scale, which would work off freely under the hammer, was a necessary part of the forging operation. However, it became important to forge certain precision aircraft parts as close as possible to finished dimensions, which required not only that scale loss be kept at a minimum, but that the surface finish after forging should be as good as possible. Special forging furnaces using silicon carbide muffles to enclose the work were constructed and provided with a special atmosphere of the NX type. These are now in operation.

Gas Pickling

In contrast to the applications just described in which fuel gas was used to form atmospheres in equilibrium with carbon steel, a parallel development involves the use of fuel gas to produce a special atmosphere which is extremely corrosive to steel and to iron oxide. The gas pickling process was developed and placed in commercial operation in time to play its part in war production in preparing cold reduced steel strip to receive a very light and very adherent coating of zinc for corrosion protection. Zinc coatings as ordinarily applied will not resist fracture and spalling in drastic forming operations. Also, in the prewar period there was no generally available process for applying satisfactory zinc coatings to cold-reduced steel strip. Development of the gas pickling process was originally undertaken to meet these deficiencies. The resulting treatment accomplishes everything that was anticipated and promises to have many interesting applications to other products in the near future.

The basic concept of gas pickling involves the treatment at red heat of a more or less oxidized steel surface with a gas containing hydrogen chloride and little or no water vapor, resulting in the formation of vapor chlorides of iron. As contrasted with conventional pickling in acid solutions, gas pickling is evidently successful in removing oxides and other impurities which may be buried in surface fissures or in the grain boundaries of the steel, at the same time producing a characteristic pattern of etch on the surface entirely different from that secured with acid pickling. The combination of chemical cleanliness and the physical configuration of the surface is apparently responsible for the vastly improved adherence secured with coatings of almost any type on steel surfaces prepared by gas pickling.

A recently developed laboratory technique for microscopic examination of solid surfaces by means of transparent plastic replicas has made it possible to compare the physical characteristics of the acid pickled and gas pickled surfaces. Figure 6 shows the results of pickling steel in acid solution. Photographs have been taken through plastic replicas at two magnifications. These pictures indicate that the pickling action with acid solution evidently results in a violent fracturing and blasting away of the steel surface, possibly as a result of the pressure of hydrogen formed in the fissures of the original surface. The resulting structure is obviously irregular and, because of internal fractures, poorly adapted to providing a firm bond for a superimposed coating.

Figure 7 shows the surface structure secured with gas pickling. The upper photograph has been taken five microns from the crystal face to show the relatively uniform depth of etch at the crystal boundaries. The lower photograph indicates that the original grain structure has not been disturbed and that the etching action is very selective at the grain boundaries. It can be concluded that a coating applied to such a surface is intimately bonded into the channels formed at the grain boundaries and that the cohesion between surface grains and underlying material has not been impaired.

The atmosphere used for gas pickling may contain from 10 to 30% anhydrous HCL and the balance may be neutral or oxidizing gas. Low water vapor content in the atmosphere is desirable since water vapor is an end product in gas pickling of iron oxide and its presence therefore tends to slow up the desired reaction.

Several methods of preparing a gas of this type were tried before one was developed which was sufficiently simple and economical. It was discovered that by burning a mixture of hydrocarbon fuel gas with chlorine and air in proper proportions, the hydrogen of the fuel gas would combine preferentially with the chlorine and the carbon of the gas with the oxygen of the air to give an atmosphere having a high concentration of hydrogen chloride with little or no water vapor. A simple calculation will show that when using methane as the fuel gas the possible concentration of hydrogen chloride is around 40%. It was found later that best results were secured with a lower concentration, permitting more accurate control of the pickling action, and the present practice is to dilute this atmosphere with a neutral flue gas from which water vapor has been removed to secure a pickling atmosphere with not over 20% hydrogen chloride.

Figure 8 shows in diagram form the apparatus used for forming the gas pickling atmosphere. The cold washed gas from the flue gas generator is mixed with the hot gas from the chlorine burner, giving a mixture temperature very close to the temperature of the muffle into which the mixture is discharged. Figure 9 is a diagram of a production line for gas pickling steel strip continuously. The strip is preheated in a separate furnace using an oxidizing atmosphere to burn off rolling oils. After passing through the muffle of the gas pickling furnace, the strip is cocled and quenched, leaving the unit with a uniform etch and a chemically clean surface.

The entire operation of preheating and gas pickling is accomplished in a

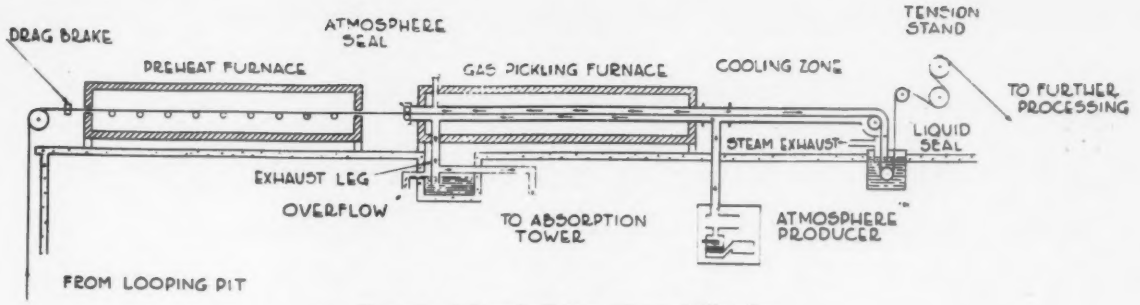


Figure 9. Schematic diagram of gas pickling line

fraction of a minute. This permits high operating speeds with equipment of reasonable size. Thus the gas pickling operation can be accomplished in line with high speed coating processes and with only one handling operation for strip coils.

In the early development of the process, it was realized that the temperatures used for pickling would also anneal hard cold-reduced strip with results satisfactory for most applications. It was also found that rolling lubricants were entirely removed from the strip during the heating and pickling operation. As a result, the gas pickling line processes strip exactly as received from the cold reduction mill, eliminating the cleaning or degreasing and the box annealing ordinarily required to prepare strip for coating. The process originally conceived to make possible a very special kind of galvanized coating may yet prove to be the most economical way of producing galvanized steel strip for any application, even where the superior adherence is of no additional value. In this event, we may anticipate a drastic revision of some steel mill practices.

Flame Impact Heating

In the typical application of gas fuel to industrial heating, a series of gas flames is used to heat a furnace enclosure which in turn radiates heat to the work. The furnace enclosure in this case is maintained at approximately the final temperature desired for the work. The work, therefore, approaches its final temperature at a continually diminishing rate. For such heating applications, the speed of heating is definitely limited by final heating temperature and the emissivity of the work surface or its capacity to absorb radiant heat.

In some furnace designs, advantage is taken of the velocity of combustion gases entering the furnace to secure some circulation of hot furnace gases over the work surface. This adds an increment of convection heat transfer to the radiant heat received from the furnace refractories. In low temperature furnaces, to secure satisfactory heating rates and final uniformity, the furnace atmosphere may be circulated or agitated by mechanical means to increase the velocity of gases over the work surface and correspondingly increase the convection component of heat transfer.

The forced convection furnace is now accepted as standard equipment for almost all heating and heat treating operations below 1000° F., and for some specialized work at much higher temperatures. But in general, for any well designed and well operated industrial furnace, the furnace temperature is only slightly above the desired final work temperature, with the result that work temperature is not a critical function of time in the furnace.

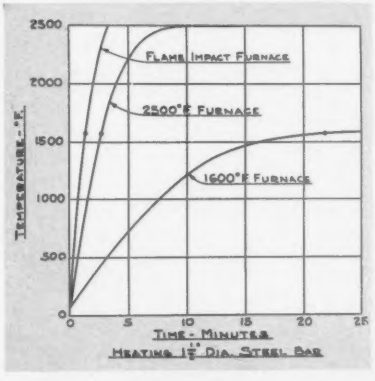


Figure 10. Relative heating rates, flame impact heating versus conventional furnace heating

Industry, however, is always interested in faster ways of doing things. One obvious way to increase heating rates is to use furnace temperatures much higher than the desired final work temperature, and to remove the work at just the right moment during heating. This involves a precision in handling not required with the older method, but it is becoming more and more possible to build such precision into industrial handling equipment.

With an unlimited furnace ceiling temperature, we can utilize another very potent source of heat transfer by allowing the gases issuing from burners at high velocity and near theoretical flame temperature to impinge directly on the work. The refractory enclosure now becomes of secondary importance since it will catch burned gases on the rebound from the work, absorb some of their heat and reradiate this heat to the work surface. The refractory enclosure, although now secondary, is still a very important part of the apparatus if we propose to heat to high temperatures. The work temperature in equilibrium with heat received from the flame and heat lost by radiation will be greatly increased by adding a refractory enclosure, with corresponding improvement in effective heat transfer to the work at lower

(Continued on page 182)

"Kitchen of Tomorrow" on Tour

SETTING out to design a kitchen that would be genuinely functional, H. Creston Doner, director of the Libbey-Owens-Ford Glass Company, started from scratch and came up with a super-efficient workroom that is not only replete with labor-saving devices, but also converts instantly into highly decorative extra living space that can blend harmoniously with other living rooms.

First exhibited in Macy's in New York, where 12,000 persons a day saw it, the Kitchen of Tomorrow, as it is featured to the public, is now on tour through the country. Originally described as an electric kitchen, the units on tour will be accompanied by demonstrators who will emphasize the fact that the appliances shown can be operated equally well by gas or by electricity.

Assembly Line Technique

Assembly line technique in the Kitchen of Tomorrow is the basis for the arrangement of the refrigerator, work space, sink and stove so that a meal can be prepared, served, and cleaned up without any lost motion.

Timing devices for all cooking units, separate lighting fixtures for each working surface, glass storage cabinet and refrigerator walls, adjustable height for all equipment, elimination of outswinging doors—and resulting bumped heads—and elimination of all stooping and bending are among the kitchen's outstanding features.

When the kitchen chores are done, fixtures like sink, stove and dishwasher disappear behind wood-finished cases and the 11 by 14 foot kitchen becomes study, game room, buffet, bar or part of the adjoining living room.

The horizontal refrigerator is built into a high screen which divides kitchen and dining space and thus becomes part of the architecture of the room. It opens into both the kitchen and dining side and has a revolving shelf where cold dishes may be arranged in the kitchen, then swung around for service on the dining side.

At one end of the refrigerator unit is a glass china cabinet opening into both the kitchen and dining space. At the other is a small towel cabinet above the refrigerator device which uses otherwise wasted heat to dry kitchen linen.

Cooking in tomorrow's kitchen is done on a new unit that really deserves the tag "compact and convenient." Concealed in a wood-patterned buffet hung at proper working level, the cooking unit has a sliding cover which, when lifted, forms a self-illuminated vitrolite splash panel. Waffle iron, sandwich grill and automatic toaster are permanently installed. Close by is a food mixer which reaches everywhere it's needed. Glass-covered vessels in heat-saving recesses of the cooking unit are also used as serving dishes.

The old-fashioned, hard-to-get-at oven is replaced by a highly versatile affair that broils, roasts, pan-fries, and, equipped with a motor-driven spit, even barbecues. On tomorrow's no-stoop level, it is covered by a heat-tempered glass hood that keeps heat inside where it belongs while permitting a full view of the cooking process. Heating element and hood raise or lower at the push of a button.

Three complete kitchens are on tour and they will be exhibited in the following cities, subject to change:

Kitchen No. 1—East

Feb. 29 to Mar. 11 New York, Macy's
Mar. 20 to Apr. 1 Newark, N. J., Bamberger's
Apr. 10 to Apr. 22 Boston, R. H. White Co.
May 1 to May 13 Philadelphia, Gimbel Bros.
May 22 to June 3 Washington, D. C., Hecht Co.
June 12 to June 24 Pittsburgh, Pa. Kaufmann's

Kitchen No. 2—Midwest and North

Apr. 10 to Apr. 22 Cleveland, Taylor's
May 1 to May 13 Detroit, Hudson's
May 22 to June 3 Toledo, O., Lasalle & Koch's
June 12 to June 24 Indianapolis, Wm. H. Block Co.
*July 3 to July 15 Milwaukee, Ed Schuster & Co.
July 24 to Aug. 5 Minneapolis, Dayton Co.

Kitchen No. 3—Chicago—South and West Coast

Apr. 10 to Apr. 22 Chicago, Marshall Field
*May 1 to May 13 St. Louis, Stix, Baer & Fuller
*May 22 to June 3 New Orleans, Maison Blanche
June 17 to July 1 Los Angeles, Bullock's
*July 10 to July 22 Oakland, Cal. Kahn's
*July 31 to Aug. 12 Portland, Ore., Meier & Frank
*Aug. 21 to Sept. 2 Seattle, Frederick & Nelson

* Tentative Dates.

New Plastic from Natural Gas

POLYTHENE, a new plastic of wide usefulness, has been developed from natural gas by Du Pont chemists. It is said to possess physical characteristics that will give it a place in the manufacture of toothpaste tubes, wire insulation, waterproof coatings, piping and adhesives. In thin sheets it is flexible without being limp and rubbery, while in thicker shapes it is stiff enough to be classified as a rigid plastic.

Polythene is made by the polymerization, or chemical welding, of large numbers of ethylene molecules. Ethylene is a gas derived from petroleum, natural gas and coal, hence is a cheap, easily obtainable raw material.

Libby-Owens-Ford's conception of tomorrow's kitchen

Why Gas Excels . . . *or the Postwar Observations of a "Reformed Gas Man"*

By A. M. Beebee

Rochester Gas and Electric Corp., Chairman, Postwar Planning Committee

A. M. Beebee

It does not take much of a soothsayer to predict that when the postwar period arrives there will be a confusion of markets, as well as a wild scramble for equipment. Furthermore, as a result of the great expansion which has taken place in all basic industry and particularly in the electrical equipment industry, when the slow-up in munitions work arrives a real effort will be made by them to keep their present employees at work. This is as it should be.

Challenge of Competitors

Some of the industries which have expanded to the greatest extent are interested in the manufacture of products which will challenge our basic market. I do not need to be specific. These interests have tremendous advertising power and prolific sales outlets and merchandising power.

The electrical utility industry likewise has greatly expanded and we may be sure that this community of interest will result in real formidable activity.

There are indications that the American housewife has fallen for the glamor of the electric way of doing things. Numerous surveys show that this impression is more deep-seated than we may like to admit. It also shows that this impression has been founded on what she has been led to feel rather than on experience.

Numerous social planning agencies and governmental programs have contributed to this thinking and will be a powerful influence to counteract.

It does not, therefore, take much of a soothsayer to see that we can expect a "blitz" on our basic market the like of which we have never seen before.

We must bear in mind that over three fourths of the energy used in a home (exclusive of house heating) is used in cooking and water heating, which fact will be looked on with longing eyes by an overly-expanded electric industry.

We must also remember that rate structures (both gas and electric) are designed so that added uses involve lower costs for the added load. The focal point in the domestic kitchen is the range, which has a very poor load factor and if this were the only load involved, we would not have much to worry about, since fundamentals are such that we can more economically serve such poor load-factor loads.

Electric Range Is Wedge

However, this load is the foundation upon which sound and profitable increments of business, either of gas or electricity, can be built to the advantage of the customer and the industry. The electric industry recognizes that the electric range is the wedge by which the whole economic structure of the gas industry can be threatened. It is true that the electric industry is aware that once having secured the cooking load from gas (the beachhead so to speak) it must immediately gain other loads, such as off-peak water heating to restore its economic earnings. All of which emphasizes the focal importance of the gas cooking load and its immediate coordination with other domestic gas uses.

Therefore, again it does not take much of a soothsayer to see that the focal point of attack in the "blitz" will be on the range.

I mention all this because it may help you visualize the reasons back of some of our most interesting Postwar Committee activities and also to explain the "why" of our program.

I will not burden you with a resume of our basic studies or the details of our program which can be read at home from the various publications of our committee which have been and will continue to be issued to the industry.

From the above you can see why it is necessary that we as an industry become mobilized, especially since our industry is in a position to render a service in these basic markets that excels all others, no matter from what angle you consider it. To that end, our committee within the next few weeks will come out with a series of "Recommendations to the Industry" —some 29 as now drawn up. We hope these recommendations can be the rallying ground on which we can build an offensive and cease being on the defensive. When these recommendations come out, we urge your careful study and support in the interest of what is good for the whole is good for the part.

Education of a Gas Man

Now here is where I really step out of my role as chairman of the Postwar Committee to discuss a few personal observations.

I have already referred to the importance of the range in the kitchen. One other point that has greatly impressed me is that our industry has too long failed to appreciate or recognize the superiority of the service we can render in the kitchen over any other fuels. Women who have compared their experiences with modern electric ranges with old antiquated gas ranges have caused a false impression to grow, which we have done little to offset. This fact, plus the

Presented at Eighteenth Annual Business Conference, The New Engand Gas Association, Boston, Mass., March 23, 1944.

formidable sales activity confronting our customers, has created an attitude of mind that has caused many a gas man to develop an unjustified inferiority complex.

This inferiority feeling is deeply rooted and has been too long with us. I happen to be an electrical engineer by training and when I first applied for a job with our company, after graduating from college nearly 30 years ago, I well remember I wanted to get a job in the Electric Department but was told the Gas Department was the only opening. I did not want to go into that department because I thought "gas was a dead industry."

I also remember in high school, our chemistry teacher in Rochester each year took the class to the gas works, and on the date in question I went to her and asked that I be excused from the trip, as I thought "that industry was a sinking ship." It is ironical that the gas plant is the one I have been privileged to operate and it has thus helped me to learn the truth. That was some 35 years ago and it still has a familiar ring in the minds of too many people. If it was a "sinking ship" then, it certainly has been a long time sinking, and when you compare the growth that has taken place in the Gas and Electric Departments of our company since that "crack" both ships must be leaking badly, for they have shown progress that is surprisingly similar.

Sinking Ship Never Sinks

It is this lesson that has made a profound impression on me and has caused me to study the reasons why this sinking ship manages to plow ahead and hold its own in some very fast company and through some very heavy seas. There are definite fundamental reasons why this is so, which I feel we should all keep ever before our eyes.

1. Gas and electricity are merely convenient means for conveying energy.
2. Where heat is desired, from two to three times the useful heat can be transported to a customer in the form of gas from a pound of coal as can be transported in the form of electricity, and therefore the combination gas and electric service in the home is to the best interest of society, as well as the conservation of natural resources.
3. Two-thirds of the energy used in a community is in the form of heat and only one-third is in light and power. Hence the eventual economic field of gas is an ever-expanding one.
4. Gas can be stored where electricity cannot, which means that we have definite fundamentals in our favor, enabling us to serve short, heavy cooking loads with a minimum of investment, which benefits both the customer and the supplier.
5. Gas pipe costs vary as the direct function of the diameter, while the capacity as the square which means that poor load-factor loads do not carry the expected penalty.

These plus many other reasons are why our gas load has grown nearly apace with the electric load. It also explains why in our company, which supplies a typical community, the output of the Gas Department in energy units on an average day is twice that of the Electric Department, in spite of the fact their load contains some 70% of the industrial power to industries, while the gas industrial load is but 30% of the load. It is further of interest to know that the revenue from this greater amount of energy sold to the community in the form of gas is approximately half that of the Electric Department.

These are merely examples that show the economic soundness of our industry and why the sinking ship never sinks. It also emphasizes the fact that the gas industry is the truck horse of a modern form of energy distribution to a community. I should like to quote from the following statement made by the British Minister of Fuel and Power, Rt. Honorable Major G. Lloyd George at the Annual Meeting of the British and Electrical Development Association on March 19, 1943.

"Gas and electricity have had many tussles, but now there must be cooperation between them. We would not get the best if there were an internecine struggle. The two industries must be complementary, not antagonistic. With such cooperation we could look forward to the future with confidence."

Also an interesting similar comment is found in the British Gas Federation report of October 1943.

"The paramount consideration is that the fuel user should be able to obtain the service most suitable and acceptable for his purpose, consistent with the proper utilization of the Nation's fuel resources. . . . The functions of such a Council would be not to destroy but to regulate competition, to check abuses, to stimulate improvements and to ensure that due regard is paid to the National Welfare."

"It would be found that directions could be agreed (on technical and economic grounds) for the expansion of both gas and electricity for domestic and industrial purposes and that such expansion would be in the interest of both consumers and the Nation as a whole."

Showing that an appreciation of our service in this country is beginning to be realized, I should like to quote the following statement by United States Supreme Court Justice Jackson, in the recent Hope Natural Gas Co. case, which depicts a measure of the gas industry's social contribution to the welfare of the nation and is an outstanding tribute to the natural gas industry specifically:

"Utilization of natural gas of highest social as well as economic return is domestic use for cooking and water heating, followed closely by use for space heating in homes. This is the true public utility aspect of the enterprise, and its preservation should be the first concern of regulation. Gas does the family cooking cheaper than any other fuel. But its advantages do not end with dollars and cents cost. It is delivered without interruption at the meter as needed and is paid for after it is used. No money is tied up in a supply, and no space is used for storage. It requires no handling, creates no dust, and leaves no ash. It responds to thermostatic control. It ignites easily and immediately develops its maximum heating capacity. These incidental advantages make domestic life more liveable."

Electric Propaganda

However, equally disturbing in the opposite direction is a recent statement by the chairman of the Federal Power Commission before the House Committee, in which he said:

"Within five years after the war the average home will be using double the amount of electricity it now uses and in 20 years the average home will be using as much electricity in a month as it now uses in a year."

This is propaganda that we should counteract whenever we can by pointing to the unsound economics back of such a policy, as well as the wastefulness of national resources.

In the process of my education however I must confess I began to develop the "jitters" when the electric range really began to improve its service, for in my ignorant way I thought it "had something."

Then began another process of education for me. I thought it strange that our Home Service girls would always insist on a gas range when they wanted to put on a demonstration in a theater and insist on our going out into the street, digging up a main and running in a service, when

the theater had electric wires all over the place.

Then one day I happened to read a letter from the superintendent of our Appliance Testing Department, who is also superintendent of the Electric Distribution Department outlining to an electric range manufacturer what was wrong with these things I had grown to fear, as compared with the service that a gas range can offer. I wish I had time to read that letter, for to me it is a classic and contributed much to my education.

We then got busy to learn the facts and we found much which I will only touch on briefly. We found that of course a gas range installed will cost less than an electric, and can be operated from $1.00 to $2.00 a month less, but that these items in themselves are not decisive except if gas cooking is capable of superior results. The flexibility, simplicity, reliability and speed of gas have long been realized, but it is in the oven and broiler of a gas range that real superiority exists, and such superiority is not often understood. To explain this latter point, the following is offered:

Artists at the Gas Range

To enable the American housewife to be an "artist in the kitchen" will help re-establish in the postwar period some of our most cherished American ideals.

Proper baking of cakes, breads, and biscuits requires proper application and control of heat, as well as proper timing. If "Time and Temperature" are accurately controlled, every housewife can become an expert in the art of the preparation of good food. Control of time factor is simple but the more vital factor of uniformity of temperature is not so easy to obtain. It is in this field that the modern gas range excels all other types of cooking appliances, because it is the only one that has automatic "throttling control." Gas ranges which do not have the "on and off cycle" of operation therefore are not subject to the sharp variations in temperature which cycle operation involves.

It is these variations that so frequently impair delicate cooking operations, as well as to cause results that are not uniform, since a cake set in an oven in one case at the start of such a cycle, for a given period of time, may produce entirely different results the next time, with exactly the same setting of temperature and time. There is a wide swing in temperature of electric ovens and variations in temperature in one part of the oven as compared with another. The temperature swings in a gas oven show a practical straight line, and only a 3 or 4 degree variation in any part of the oven as compared with the regular setting. Is it any wonder a gas oven can produce such reliable results and make "time and temperature control" so effective?

The reason for this is that gas range oven temperatures are maintained by throttling control which means absolutely uniform temperature, not only at one point of the oven but also throughout the entire oven, which is the reason that time and temperature control can produce unfailing results in a gas oven. Furthermore, because gas ovens are almost entirely heated by "convected heat," they are not affected by shadows created by utensils in the oven, nor by the scorching influence of radiant heat, as is the case with some other methods of cooking. Poor cooking results are as often the result of faults in the equipment as they are due to mistakes of the housewife.

Gas Broiling

Gas broiling in modern gas ranges is essentially smokeless and odorless, because the vapors evolved must pass through a flame which incinerates them. The result is startling and surprising. Food experts tell us that broiled foods are healthy as well as appetizing and the open charcoal broiler in many back yards is testimony to the popularity of this method of preparing favorite cuts of meat.

Testimony to all the above is found in the following statement taken from Life Magazine (Oct. 17, 1943) when describing the famous "Pump Room" in Chicago.

> "They have devised an exuberant Hollywood setting based apparently on the premise that anything good to eat will taste that much better washed by tongues of fire."

However, in spite of all this knowledge about the superior ability of a gas range to perform the cooking operations, I fell for the illusion that electric cookery was cleaner. Here again I had an education, for our studies showed that the greases, odors and grime associated with old-fashioned methods of cooking are the result of distillation of the oils, fats, vapors and greases that are present in certain foods. The type of fuel used has nothing to do with the creation of these odors or greases, since the effect of temperature on the food being cooked is the cause.

Because gas has heat quickly available in large quantities at low cost, there has been a tendency for the housewife to use high temperature cookery with gas and thus to associate the dust and grime from such cooking with gas. The apparent cleanliness of the electric range has been due to the fact it was forced to adopt low temperature cookery, and which we will admit has several collateral advantages from a nutritive point of view. Some people however prefer the flavor of meats roasted, fried or broiled in the manner that tends to produce odors and smoke. However the customer can adopt the principle of lower temperature cookery with a modern gas range if she chooses, but she does not have to. Thus a gas range is just as clean as an electric range.

Calculations have been developed which show that a gas range in the kitchen will result in economics which will offset approximately half the premium of manufactured gas fuel over other automatic fuels for house heating, thus helping the American home owner to enjoy the privileges of automatic gas heating.

Thus we find that one hand helps wash the other and a broader and better service to our customers results.

Therefore you perhaps see why I become what I call a "Reformed Gas Man."

Joint Range Survey

IN an article entitled "The Kind of Gas Range Pittsburgh Dealers Say Women Want," the A. G. A. MONTHLY for March stated that the range survey was conducted by The Manufacturers Light and Heat Company, W. L. Hutchinson, merchandise sales manager. This activity was a joint undertaking sponsored by the three Pittsburgh gas companies under the jurisdiction of Christy Payne, Jr., of the Peoples Natural Gas Co., and F. B. Jones, of the Equitable Gas Co., and Mr. Hutchinson, of Manufacturers.

Accident Prevention Committee Sets Up 1944 Program

George J. Ruoff, Chairman, Accident Prevention Committee

AT a well-attended and enthusiastic meeting in New York, February 25, the Accident Prevention Committee of the American Gas Association completed its organization and perfected its 1944 program. Under the chairmanship of George J. Ruoff, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., a vigorous and forward-looking program of accident prevention for the gas industry was launched.

Among the 19 members and guests who attended were three past chairmen, H. H. Berman, F. W. Fisher, and Roy M. Godwin, and two affiliated association representatives, P. A. Alberty, Ohio Gas and Oil Association, and Dave M. Eckman, Michigan Gas Association. The Technical Section was represented by Charles Koons, chairman of the Subcommittee on Safe Manufactured Gas Practices; L. K. Richey, chairman of the Subcommittee on Safe Distribution Practices; and D. Whitcomb.

Award Rules Modified

Considerable discussion took place regarding proposals to modify the rules governing McCarter and Million Man-Hour Awards. The Subcommittee on Safety Awards, John M. Orts, chairman, was instructed to investigate the possibility of changing the McCarter Award rules. In connection with the Million Man-Hour Awards, it had been suggested that the committee set up some form of recognition for large companies or departments which had continued their record of 1,000,000 man-hours without a disabling injury accident, and for small companies making commendatory records of less than 1,000,000 man-hours without a disabling injury accident.

It was decided that companies or units thereof which had continued their no disabling injury accident record to the point of two million or longer man-hour periods would receive a new million man-hour award certificate inscribed with the total man-hours of operation without accident. Recognition of smaller companies with no-accident records for lesser man-hour periods will be studied by a Subcommittee on No Disabling Accident Awards, H. H. Berman, chairman.

At the suggestion of E. S. Miner, chairman, Public Utilities Section, National Safety Council, a half-hour program was arranged for the next National Safety Congress program for discussion of "Problems Confronting the Safety Engineer in the Gas Utilities." It will include a speaker from the Natural Gas Department and one from the Manufactured Gas Department, with additional time devoted to general discussion. H. J. Burton was appointed chairman of a Subcommittee on Safety Programs and Exhibits to make arrangements for this and other meetings.

It was indicated that the annual bulletin, "Review of Fatal Injuries in the Gas Industry," prepared by the A. G. A. statistical department, would be published shortly. The only change in this bulletin will be inclusion of a chart showing the frequency and severity rates for the manufactured, natural and combined gas industries. Effective methods of securing and filing accident data from gas companies were discussed and this matter was referred to the Subcommittee on Accident Reporting and Recording under the chairmanship of D. C. Stewart.

Lost-Time Accident Analysis

The need for analysis of lost-time accidents reported by companies represented on the committee was emphasized and it was decided that Mr. Stewart's subcommittee should undertake such an analysis. It was felt that the lost-time accident analysis would provide ready material for themes to be used in "Foremen's Letters" and for publicity. The opinion was expressed that accident analysis work is the most valuable service that the committee could render to the industry.

In discussing Safe Distribution Practices, Mr. Richey, chairman of this subcommittee, called attention to the importance of adequate safety precautions and instructions for gas service men to use while servicing gas appliances on customers' premises. There was full discussion of the procedure followed in setting up approval requirements for various gas appliances and for installation.

W. T. Rogers, chairman of the Subcommittee on Publicity, outlined a comprehensive program of publicity on accident prevention matters which was adopted in full. It calls for the use of space in the A. G. A. MONTHLY, continuation of the "Foremen's Safety Messages," and distribution of special bulletins to company safety men.

H. T. Jayne was appointed chairman of a Subcommittee on Safety Equipment to review, inspect and make recommendations on any safety and resuscitation equipment that may be submitted to the Association. There was extensive discussion relating to "suck and blow" resuscitators which are discussed elsewhere in this issue of the MONTHLY.

Reporting on Safe Manufactured Gas Operations, Mr. Koons, chairman of this subcommittee, stated that his group would undertake studies on the following subjects: Safe Practices in Coke Oven Operations, Safe Practices in Water Gas Manufacture, Organizational Methods and Duties, Educational Safety Films, Purging Practice, Safe and Hazardous Designs, Hidden Hazards in Maintenance and Operations, and Chemical Accidents. A short report on "Hazardous Designs" is planned for the June Production and Chemical Conference.

H. L. Hershey was appointed chairman of a subcommittee to report on "Explanations of Unusual Fires or Explosions on Gas Company Premises for the Years 1940-1943 Inclusive." J. B. Harris was named chairman of the Subcommittee on Safety Film Service which is to identify and list all such films available.

A.G.A. Ad Cited

THE gas industry's national advertisement entitled, "Thanks Mom" which appeared in the *Saturday Evening Post* of March 20, *Life* of March 22 and *Colliers'* of March 27, 1943, has been selected as one of the outstanding wartime advertisements of that year by the Wartime Advertising Awards.

A Certificate of Merit has been awarded in duplicate to the American Gas Association and its agency McCann-Erickson, Inc. This year, on account of wartime conditions, a special series of Wartime Advertising Awards was made in place of the regular Annual Advertising Awards which were founded in 1924 by Edward Bok and resumed in 1936 by the magazine Advertising & Selling, after a lapse of five years.

This is the second occasion on which the "Thanks Mom" ad has secured special recognition. Last June the Office of War Information and the Advertising Council selected this particular advertisement as one of the fifty advertisements which was most effective in promoting the civilian war effort of America.

Gas Sales Increase in New Jersey

REFLECTING the magnitude of the war effort in its territory, Public Service Corp. of New Jersey reports that sales of gas to industries increased 25.64 per cent in 1943 as compared with 1942. Gas sold to residential customers, exclusive of building heating, amounted to 18,204,073,200 cubic feet, a gain of 4.31 per cent over 1942. Building heating gas sales for 1943 amounted to 4,407,329,300 cubic feet, or 1.98 per cent above 1942. At the end of the year there were 16,621 installations.

New England Gas Association Holds Annual Business Conference

Hall M. Henry
New N.E.G.A.
President

AMPLY fulfilling its primary aim of "surveying an essential industry's progress in the war," the eighteenth annual business conference of the New England Gas Association, held March 23 at the Hotel Statler, Boston, was an outstanding success. Under the able leadership of President N. B. Bertolette, president, The Hartford Gas Company, the conference recorded many substantial contributions to the war and accented the industry's post-war tasks.

D. S. Reynolds *L. E. Knowlton*
Elected Vice-Presidents

Hall M. Henry, director of gas operations, Negea Service Corp., Cambridge, was elected president for the 1944-1945 term. D. S. Reynolds, vice-president and chief engineer, Boston Consolidated Gas Co., was named first vice-president and L. E. Knowlton, Providence Gas Co., was chosen as second vice-president. E. H. Eacker, vice-president, Boston Consolidated Gas Co., was elected treasurer, and Clark Belden, N.E.G.A. executive secretary, was re-elected clerk.

Fourteen directors were elected, as follows: J. A. Cook, G. R. Copeland, E. M. Farnsworth, E. L. Hall, A. V. S. Lindsley, I. L. Moore, A. G. Neal, E. F. Putnam, R. E. Ramsay, P. J. Rempe, J. J. Scott, E. G. Twohey, J. L. Underhill and A. M. Wolfe. Retiring President Bertolette and the following additional recent past presidents were named ex-officio directors: John West, C. G. Young, J. A. Weiser and R. J. Rutherford. New division chairmen also serve on the board.

Newly elected division chairmen are: Accounting—J. C. Stewart, Blackstone Valley Gas & Electric Co.; Industrial—A. J. Huston, Worcester Gas Light Co.; Manufacturers—G. P. Velte, American Stove Co.; Operating—F. H. Faulstich, Springfield Gas Light Co.; and Sales—H. V. Potter, Fall River Gas Works Company. The Home Service Group chose the following officers: Chairman—Hazel Cheever, Malden & Melrose Gas Light Co.; Vice-Chairman—Florence Mooney, Lynn Gas & Electric Co., and Secretary—Susan Mack, Boston Consolidated Gas Company.

Following election of officers and directors, Clark Belden, executive secretary, presented his annual report which revealed the comprehensive scope of the Association's activities. At the same session Mr. Bertolette, in his presidential address, provided further details of the Association's activities and presented an impressive list of the New England gas industry's contributions to the war effort. He paid high tribute to the "unparalleled accomplishments" of the N.E.G.A. and expressed his belief that it was one of the most outstanding regional associations in America.

A special gift was presented to Roy E. Wright, of Cambridge, in recognition of his exceptional contributions to the work of the New England Gas Association. As chairman of the Sales Division and the Appliance Study Committee, as well as past chairman of the Industrial Division, he had performed unusual service to the gas industry.

Colonel Willard F. Rockwell, president,

War Record of New England Gas

High spots of a survey by the New England Gas Association as described in the Presidential Address by N. B. Bertolette. Survey results came from 46 operating companies covering 89% of the gas meters in New England.

- Gas send-out for 1943 increased an average of 36.5% over 1938 and 17% over two years ago.
- The greatest percentage increase was in the industrial class which shows an average increase of 145% over 1938 and 25.5% over two years ago.
- Fifteen companies are supplying gas to war housing projects, principally for cooking and water heating and in some instances for refrigeration. There are 33 of these housing projects, totaling 12,916 dwelling units.
- Fourteen of our companies report a variety of installations to army camps, hospitals, forts, naval bases and other armed services units, particularly supplying gas service for cooking and water heating.
- Many of our employees are serving in the armed forces. The 46 reporting companies show an average of 30 employees each in the service, which is an average of 13% of the employees of these companies.
- The gas companies of New England have participated to a great extent in the government's fuel conservation program, with the larger companies engaged most fully in this activity. The principal types of cooperation and in the order of frequency in which they were used are: newspaper advertising, bill enclosures, radio, customer letters, show-room displays and billboard advertising.
- The employees of our companies participate extensively in civilian defense, Red Cross, war ration boards, war bond campaigns, and many other war activities on the home front. The most widely reported are among the employees of 45 companies working in civilian defense and those of 35 companies in Red Cross activities. However, most replies indicate that "all of the employees are participating in community war activities."
- The extent of Home Service cooperation with the national nutrition program is varied and most extensive throughout the 46 reporting companies, particularly home volunteer and consumer information centres, lectures and demonstrations, canning activities and radio programs. The various companies have made their stores, auditoriums and display windows widely and sometimes entirely available for all phases of community war activities.
- Our employees have participated actively in the blood donor campaign. Sixteen of the reporting companies have Blood Donor Committees and an average of 30% of all employees of these 46 companies have contributed.
- It is interesting to note that 42 of the companies have an employee's bond purchase plan, 9 of which have 100% participation while the average employee participation in bond purchases is 78%.
- Twenty-three other activities, varied in scope, of which "reduction of gasoline used and tire consumption" was common to all reporting companies.

Association of Gas Appliance and Equipment Manufacturers, and president, Pittsburgh Equitable Meter Company, spoke on postwar planning from the manufacturer's viewpoint. Stating that such planning "is more affected by partisan politicians than by any other single factor," he called for a return to constitutional government rather than government by executive directives.

Work of the American Gas Association was described by President Ernest R. Acker, president, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y. In an able address, Mr. Acker focused attention on the cooperative efforts of industry and outlined some of its postwar plans.

Further attention was directed to postwar competitive problems by A. M. Beebee, Rochester Gas & Electric Corp., chairman, A. G. A. Postwar Planning Committee, who spoke on "Mobilization for Postwar Action." After giving highlights of his committee's activities, Mr. Beebee presented his personal creed regarding gas and electric competition. A large part of his talk is included elsewhere in this issue.

The morning session closed with a stimulating address entitled "America's New Frontier" by Walter R. MacCornack, dean, Department of Architecture, Massachusetts Institute of Technology, and vice-president, The American Institute of Architects. He described America's new frontier as the problem of rehabilitating and repatterning social and economic endeavor, and advocated a national organization to carry out postwar replanning and reconstruction.

Everett J. Boothby, chairman, A. G. A. Committee on Domestic Gas Research, and vice-president and general manager, Washington Gas Light Company, opened the afternoon meeting with an address on "Gas Industry Research." He described projects under way at the A. G. A. Laboratories and discussed the results of the recent technical research conferences sponsored by his committee at Cleveland and Los Angeles.

Discussing the war program of the Institute of Gas Technology, John I. Yellott, director, stated that, as a result of the educational program becoming a war casualty, the Institute's basic research program would be expanded. Basic projects, he said, will be directed towards improved methods of gas generation from coal, and better utilization of natural gas. At present, sponsored research for individual companies constitutes the largest part of the Institute's activity.

A most significant and comprehensive report on "The Importance of the Gas House Heating Load" was presented by Henry O. Loebell, chairman, A. G. A. Subcommittee on Economics of Gas House Heating. Mr. Loebell's paper is reproduced in full in this issue.

Speaking on the "Industrial Gas Outlook," Frederic O. Hess, president, The Selas Company, Philadelphia, declared that "our war production records would have been impossible without industrial gas and because of the technological advances produced by and devised for war production, the position of gas has been made still more important." He said that industrial gas consumption amounts to 58% of the total gas sendout but returns only 25% of the total revenue. An effective sales policy and more management support of the industrial gas department are needed to keep pace with the technological developments of this branch of the industry, he asserted.

Concluding the conference, C. George Segeler, engineer of utilization, American Gas Association, gave a thorough analysis of domestic gas economics with particular reference to the New England area. Pointing out that tenants occupy 65% of the 1,674,000 urban dwelling units in six New England states, Mr. Segeler said this fact represented a major obstacle to gas appliance sales and should receive special attention.

Mechanical Resuscitators

AT the last meeting of the Accident Prevention Committee there was extensive discussion of the subject of "suck and blow" resuscitators which had been discussed in an article by the late Professor Yandell Henderson in the December 24, 1943 issue of "Science." Particular reference was made to approval of resuscitators of this type by the Council of Physical Therapy of the American Medical Association.

Considerable interest was shown in the nature of the inspection and testing of these devices by the Council prior to their approval, and as to their approval by the Council "for inclusion in its list of accepted apparatus with an understanding of the limitations and hazards of positive pressure resuscitators with the expectation that it will be used only by professional or other adequately trained personnel."

It was learned that a group of those interested in resuscitation plan to discuss the proper interpretation of this approval with members of the Council with the hope of bringing about a clarification of what is meant by "professional or other adequately trained personnel," and the circumstances under which their use is recommended.

Meanwhile, the Medical Division of the National Research Council, after extended discussion among its committee members and after hearing from representatives of the various firms who offer mechanical devices intended to move air mechanically in and out of the lungs, has unanimously passed the following resolution:

WHEREAS this Conference has been requested to consider, and to express an opinion on, the advisability of the use of mechanical, artificial respiratory devices by the armed forces and other federal agencies of the United States, and

WHEREAS manual methods of supplying artificial respiration are admittedly effective when properly applied but, nevertheless, have certain obvious limitations, and

WHEREAS the Conference is cognizant of the fact that the Council on Physical Therapy of the American Medical Association has accepted certain of these devices as mechanically adequate and has stated certain qualifications regarding their use by trained personnel, be it

RESOLVED that this Conference has come to the conclusion that manual methods of artificial respiration are effective, can be applied without delay or dependence upon mechanical equipment, and by personnel easily trained. Manual methods are the methods of choice, and this is the Conference's considered opinion.

The Conference is therefore led to approve the utilization of several manual maneuvers for artificial respiration (including Schafer, Sylvester, Eve and their modifications) and where these are impossible or subject to delay, the direct mouth-to-mouth or mouth-to-nose inflation.

The Conference furthermore approves the employment of very simple mechanical devices where manual methods are not feasible or where oxygen is needed and available. The Conference would specify that these mechanical devices be of the following characters:

(1) As simple mechanically as possible
(2) As small and light as possible
(3) Provide only positive pressure with limit of 10 mm Hg (5½" water)
(4) Provide no negative pressure.

The Conference furthermore has

RESOLVED that this opinion is not to be construed as a derogation of the importance of training in first aid and manual methods of artificial respiration.

Institute's Educational Program War Casualty

THE Institute of Gas Technology at Illinois Institute of Technology will devote its activities exclusively to research for the duration, it has been announced by John I. Yellott, director. The educational program of the Gas Institute has been suspended, for recent selective service orders have ruled that graduate students in engineering and science are no longer eligible for deferments.

"Although we regret that the educational program has had to be discontinued for the duration, we plan to re-establish it on an expanded basis when conditions permit," said Prof. Yellott. "We believe that, in the immediate postwar period, there will be great interest in the fellowships of the Gas Institute, and accordingly plans will be laid out to put the educational program back into high gear just as soon as the departing fellows are available again."

"The resources of the Institute will now

be turned more vigorously to basic research," Prof. Yellott said. "Fundamental studies are about to be undertaken in both natural and manufactured gas. Methods of synthesizing liquid fuels from gas will be studied, from the point of view of adding a valuable by-product to the gas industry, and also of replacing oil for the upgrading of gas. Basic studies will also be undertaken on the nature of the fluidizing process, which appears to offer so much towards the future development of the gas industry.

"Facilities at the Gas Institute will continue to be improved and expanded," adds Prof. Yellott. "It is expected that new equipment for combustion laboratory and fluid metering laboratory work will be provided. Additions to the permanent Gas Institute staff will be made with a view to strengthening the teaching force."

Two of the 20 graduate fellows at the Gas Institute will join the full-time staff of the Institute, where they will work on war research projects. The other 18 will go into the armed services or into war industry.

Gas and the Weather

(From the London *Gas Journal*, Dec. 15, 1943)

A FEW years ago we published in the *Journal* a map showing how fuel consumption varies with locality as a result of variation in weather conditions. The map, which we thought most illuminating, was based on the "degree-day"—a term originated in the gas industry and standardized by the American Gas Association as a unit which is the difference between 65° F. and the daily mean temperature when the latter is below 65° F. . . .

Thoughts of the influence of the weather i.e., temperature—on the height of the gasholder crown are revived by a highly interesting article on the value of the degree-day which, written by Raymond Little, has just been published in the American Gas Association's MONTHLY. There can be no doubt that widespread benefit has accrued from the Association's development of this conception, and the unit has been accepted and used extensively by, among others, the United States Weather Bureau and the American Society of Heating and Ventilating Engineers.

Use of this basic weather unit is becoming more widespread. The degree-day originated from the desirability that the gas industry should have sufficient knowledge of weather conditions to enable estimates to be made of the probable consumption over a year of any given heating installation, and to apportion the gas consumption from month to month. Such information, it was felt, could often be used to advantage in checking the consumptions of installations and determining whether they were working properly, and as a help in explaining apparently high gas bills caused by extremely cold periods. No doubt at the time—and it is twenty years ago—there was scepticism concerning the practicability of the method in view of the freakishness of weather. But data were steadily and determinedly accumulated, and within reasonable limits the degree-day has proved itself a most useful instrument.

When a normal degree-day accumulation for an area has been established and the course of mean temperatures observed for a number of years, then heating requirements—in other words, gas consumption—can be predicted with quite a measure of accuracy if base load requirements are known. And with the aid of weather forecasts (we are thinking, of course, in terms of peacetime) it is possible to anticipate pressure needs and the like—a matter which will assume greater significance with the development of gas grid systems. Such knowledge should prove a valuable guide in estimating the volume of gas needed and its apportionment and in coping with peak loads. And there is another highly interesting aspect—the leading of consumers to think in terms of seasonal or average monthly cost.

In the United States many gas undertakings, to encourage the use of gas for heating, had introduced as part of their rates and tariffs an equalization plan as a means of eliminating peak bills in the cold months. Usually these plans covered a seven or eight month period, and the consumer was required to pay an average monthly amount throughout the heating season. Experience over five or six years has shown that these plans, which are based on knowledge of likely weather conditions, work in practice satisfactorily.

The American Gas Association fully believes in the potentialities of a thorough statistical study of the weather as an aid to satisfaction in sales of gas for heating, and since the war a Joint Committee on Weather Statistics has been set up representing the A. G. A., The American Society of Heating and Ventilating Engineers, the National Warm Air Association, the Oil Heating Institute, and the U. S. Weather Bureau.

R. W. Plank Dies

RUSSELL W. PLANK, division compressor station superintendent of Panhandle Eastern Pipeline Company, died March 6. He lived in Pratt, Kansas, and his office was in Iuka, Kansas.

Mr. Plank began work for Panhandle Eastern on Dec. 16, 1930. He served as chief engineer at Liberal Station, in Kansas, and at Glenarm Station in Illinois. He was made compressor station division superintendent in 1938.

Utility Promotes Advance Purchases of Appliances

A "VICTORY Purchase Plan," whereby customers can pay predetermined amounts monthly along with their gas bills toward postwar purchase of major gas appliances, is now being promoted by the Birmingham Gas Co. The utility is investing all advance payments in War Bonds.

Choice of model, style, size and price range is left until later. If the customer has deposited more than required, he is remitted the difference in cash. If his payments fall short of the purchase price he can arrange the balance in monthly instalments at 6%.

In circularizing its customers, Birmingham Gas Co. stresses these points:

1. Customer probably now has money to spare for investing in the plan; 2. By signing now he is assured a priority position when gas appliances become available in limited quantities; 3. War effort is aided by his bond investments; 4. He avoids expenses of finance charge if he were to buy on the usual instalment plan.

Booklet Aids Junior Cooking Corps

DINNER'S ready! The words are familiar, but these days the voice is different. Junior is the kitchen commando now, instead of Mother, thanks to the instructions contained in the gay new booklet "Look Who's Cookin'!" sponsored by the Company's Home Service Department of the Southern California Gas Company, Los Angeles.

In conjunction with courses in nutrition and wartime cookery for young America, the 32-page booklet is being distributed to Southern California high-school cooking classes by visiting Home Service representatives. When assignments for the course have been completed Home Service awards the successful students with the rating of "Technical Sergeant."

The booklet approaches the teaching problem light-heartedly using such quasi-military directives as: "Clear area for heavy drill." "Inspect all equipment and ingredients." "Do not administer First Aid to any tested recipe." In addition to simple menus and recipes the booklet contains definition of cooking terms, hints on measuring, suggestions for food substitutes, lunch packing, and directions for care of gas equipment.

Realizing that many women today are doing the home laundry for the first time, Home Service women are distributing upon request another educational booklet entitled "Tub Talk." This new booklet contains, among other helpful suggestions, a stain removal chart, instructions for starching and blueing clothes, and directions for sterilizing handkerchiefs.—*Gas News Week.*

Natural Gas Contributes Materially to Fuel Needs in 1942

NATURAL gas gained materially in importance in 1942 as a fuel for wartime industries and in army encampments and Federal housing projects. Marketed production in 1942 increased 9 per cent over that in 1941, reaching a new high of 3,053,475,000,000 cubic feet, and was over twice the total amount produced in 1917 and 1918 during the last war, according to the Bureau of Mines, United States Department of the Interior.

Figures for 1943 are not available, but it is estimated that marketed production increased over 10 per cent in that year. With the exception of New York, which continued the decline begun in 1939, production increased in the major States. States showing material gains in 1942 over 1941 records were: New Mexico (21 per cent); Oklahoma (15 per cent); Louisiana (11 per cent); and Texas, California and Ohio (8 per cent each).

Consumption Up 9%

Consumption of natural gas in 1942 was 3,044,773,000,000 cubic feet, 9 per cent over the peak attained in 1941. All the major classes of consumption increased except gas used in the manufacture of carbon black, which declined 8 per cent. Commercial consumption gained 27 per cent in 1942 over 1941 while domestic consumption rose only 13 per cent.

Petroleum refineries used 36 per cent more gas in 1942 and miscellaneous industrial consumption including gas used by electric public-utility power plants increased 8 per cent over the 1941 record, compared with a 17-per cent gain in 1941. The 5-per cent gain in field use was largely due to a more extensive use of gas lift in oil fields in a few States.

The major classes of consumption were as follows: field use, 721,063,000,000 cubic feet (24 per cent); domestic, 498,537,000,000 cubic feet (16 per cent); commercial, 183,603,000,000 cubic feet (6 per cent); carbon-black manufacture, 335,533,000,000 cubic feet (11 per cent); fuel in petroleum refineries, 201,670,000,000 cubic feet (7 per cent); and other industrial uses including gas used at public-utility power plants, 1,104,367,000,000 cubic feet (36 per cent).

Electric public-utility power plants consumed 238,736,000,000 cubic feet of gas in 1942 compared with 205,156,000,000 cubic feet in 1941. A small percentage of this amount is gas other than natural which cannot be segregated. There was a relative gain in consumption by commercial users and by petroleum refineries during the year and a relative decline in field use and for carbon-black manufacture.

The average value of gas at the wells was 5.1 cents a thousand cubic feet in 1942 compared with 4.9 cents in 1941 and was the highest since 1937 when the same average was recorded. The average value at points of consumption was 22.7 cents compared with 22.1 cents in 1941. This increase was due to a shift in volume to high-priced gas uses, as the average value of most of the major classes of consumption declined.

Natural gas used with manufactured gas increased 17 per cent in 1942 over the 1941 figure and totaled 77,259,000,000 cubic feet. There were 10,103,690 domestic consumers (7,589,230 using natural and 2,514,460 using mixed gas) in 1942. Of the 777,630 commercial consumers in 1942, 138,040 used mixed gas. There were 9,730,110 domestic and 766,910 commercial consumers in 1941.

Exports to Canada totaled 130,000,000 cubic feet in 1942, 7 per cent over the 1941 figure. Exports to Mexico totaled 8,572,000,000 cubic feet in 1942, a 17-per cent gain over both the 1941 figure and the peak of 7,352,000,000 cubic feet recorded in 1936.

Drilling operations were curtailed during the year by lack of labor and materials. There were 2,597 gas wells reported drilled in 1942 compared with 2,911 in 1941.

National Drive To Cut Industrial Accidents

THE War Production Board and the Department of Labor announced recently operating agreement through which the two agencies will pool their forces to reduce the toll of industrial accidents that annually result in a loss of life six times as great as the nation sustained at Pearl Harbor.

In announcing the anti-accident agreement, WPB Chairman Donald M. Nelson said:

"In 1943, 56,800,000 man-days were lost from essential production and 18,400 workers died because of industrial accidents. This vital blow at America's war production goes unrecognized by too many of us who were shocked into instant action by the loss of 3,303 lives among our armed forces at Pearl Harbor. Management, labor and government must eliminate the menace of industrial accidents—which yearly strike down a division of our soldiers of production. Such a defeat on the production line cripples our war effort just as certainly as a major military defeat in the field."

Natural Gas Statistics

THE Federal Power Commission has published "Statistics on Natural Gas Companies" containing financial and operating information on 118 gas companies. Copies can be obtained at a cost of 50¢ each (F.P.C. S-33) by application to the Commission in Washington.

"Fashions in Rations" Radio Program Begins Second Year

GEORGE S. JONES, JR., vice-president in charge of sales of Servel Inc., Evansville, Ind., has announced that a contract extension in the radio program "Fashions in Rations" had been filed with the Columbia Broadcasting System sending the popular half hour Saturday morning show into its second year of broadcasting.

In addition to the extension of the radio program which stars Miss Billie Burke for an additional 13 weeks, Mr. Jones also announced that starting April 1 the program will add 56 new stations and use the entire Columbia Broadcasting System network of 134 stations.

"After a year of broadcasting activity it is quite apparent that 'Fashions in Rations,'" Mr. Jones said, "is accomplishing its immediate objective for Servel and the gas industry as a whole which has cooperated in the sponsorship of this show."

To give the gas industry a more comprehensive picture of the value of "Fashions in Rations," Servel will publish shortly "A Report to Gas Companies on 'Fashions in Rations,'" a booklet which gives a complete picture of the radio activity during the past year.

In the 11 months that it has been on the air, this new booklet reveals, "Fashions in Rations" has attained a 47 per cent higher rating than any Saturday morning half hour program has ever achieved in a similar period. During this time the radio program, jointly sponsored by Servel and the gas industry, has attained a C.A.B. rating of 7.8 per cent which indicates that the program is currently listened to by about 2,150,000 families or more than 4,000,000 people weekly.

Since the average turnover for a daytime half hour program is 2.7 this means that 6,000,000 different families or more than 12,000,000 different people hear the program one or more times in a month. An additional point made in this report is the success that "Fashions in Rations" has achieved in reaching women. According to a recent BBDO Onondaga Panel Survey, the program attracted more women per hundred sets tuned in than any other Saturday morning program.

Personal AND OTHERWISE

E. Holley Poe Resigns from Oil Post

E. Holley Poe

E. HOLLEY POE, of Tulsa, Okla., has resigned as executive vice-president and general manager of the Petroleum Reserves Corporation, Harold L. Ickes, Interior Secretary, announced Mar. 16. Mr. Poe will return to the natural gas industry. Mr. Ickes said the job is not finished and that he has in mind a successor but could not name him yet.

Formerly secretary of the Natural Gas Section of the American Gas Association, Mr. Poe resigned June 15, 1942 to become director of the Natural Gas and Natural Gasoline Division of the Office of Petroleum Administration for War. On October 14, 1943, Mr. Ickes announced his appointment to the petroleum post.

Both Mr. Ickes and Deputy Petroleum Administrator for War, Ralph K. Davies expressed regret at Mr. Poe's resignation. Mr. Ickes extended his thanks for "your loyal and efficient service." Mr. Davis praised Mr. Poe's record in a message which said in part:

"Your conduct of the Natural Gas and Natural Gasoline Division of PAW carried through some of the more stormy periods of the agency's life and you have, therefore, reason for an especial pride in the success of the operation. . . . Your record with PAW is a record of accomplishment from first to last. In the days to come, I am sure you will derive much satisfaction from the knowledge that you so effectively contributed in Government service during the critical war period. You did a full share and did it outstandingly well."

Mrs. Hart Joins Servel

APPOINTMENT of Mrs. Virginia Hart as kitchen planning consultant to the Advertising and Sales Promotion Department of Servel, Inc., Evansville, Indiana, was made in March by R. J. Canniff, manager of the department.

Mrs. Hart, one of the nation's foremost kitchen designers, began her planning activities while connected with the New York offices of the Kitchen Maid Planning Corporation in 1930. Her original connection with the gas industry came in 1933 when she edited "Modern Kitchens, A Handbook of Design and Construction" for the American Gas Association. In that same year Mrs. Hart designed and organized the kitchen headquarters for The Philadelphia Gas Works Co. From 1934 to 1936 she was connected with the Consolidated Gas Company of New York while organizing their kitchen planning service. From 1937 to 1942 she was the associate editor of "House and Garden," in charge of home equipment.

John Alden Retires from Jersey Central

JOHN D. ALDEN, engineer in charge of gas operations for the Jersey Central Power and Light Co., and well known in the utility industry which he has served in a technical and executive capacity for 41 years, retired from the company, effective March 1, according to an announcement of Thomas R. Crumley, president.

Mr. Alden has been in the utility business since 1903, following his graduation from Stevens Institute, taking his first job with the United Gas Improvement Co. He was also graduated from Columbia University, but served in the Spanish American War between that time and the time he entered Stevens.

His utility work has taken him over many parts of the country, and he has been instrumental in the organization and technical development of many companies. He is a member of the Gas Production Committee of the American Gas Association.

In 1924 he became associated with the National Public Service Corp. and went to Asbury Park during the formation of the Jersey Central Power and Light Co. As gas engineer with Jersey Central he effected the technical integration of 11 separate gas companies in Dover, Boonton, Long Branch, Belmar, Toms River, Lakewood, Tuckerton, Ocean City, Sea Isle, Wildwood and Cape May.

He is not only a descendant of John Alden who came on the Mayflower in 1620, but his mother was also a descendant of Lt. Thomas Tracy one of the first settlers of Norwich, Conn.

He is a member of American Society of Mechanical Engineers, the American Gas Association, and is past president of the New Jersey Gas Association.

Donnelly Joins A. O. Smith Corp.

J. E. WOODALL, home appliance sales manager at A. O. Smith Corporation, announces the appointment of Jim Donnelly as sales manager of the Gas Water Heater Division. Mr. Donnelly assumed his new duties on March 1, and is making his headquarters at the A. O. Smith Corporation General Offices in Milwaukee.

Mr. Donnelly was long associated with the Bastian-Morley Company, Inc., La Porte, Indiana, as sales manager.

He was chairman, Water Heater Division and member of Board of Directors, Association of Gas Appliance and Equipment Manufacturers, 1942 and 1943. He is currently chairman, Water Heater Marketing Committee, A.G.A.E.M., member of the American Gas Association Water Heating Committee and the O.P.A. Water Heater Industry Advisory Committee.

Captain Borger Returns from Frontline Duty

Captain Borger

CAPT. EDWARD M. BORGER, American Field Service, has returned to Pittsburgh and the presidency of The Peoples Natural Gas Company after a year of frontline duty in Egypt, Tunisia and Italy.

Mr. Borger left the United States Nov. 23, 1942 in charge of a detail of 100 American ambulance men and was in service for 16 months, going first to Syria and then to join the British Eighth Army in Lybia and Tunisia. He was engaged in forward ambulance work with the New Zealanders when they flanked the Marith line and broke the German front. He was in Italy when relieved.

The American Field Service is financed and equipped entirely by American contributions. Ambulances are provided and the members are all volunteers, serving without pay except a $20-a-month living allowance.

Appointed Attorney for Lone Star Gas Co.

Marshall Newcomb

PRESIDENT D. A. HULCY of Lone Star Gas Company, Dallas, has announced the election by the company's board of directors of Marshall Newcomb to be general attorney of the company. Mr. Newcomb for nine years has been assistant general attorney. He became an attorney for the company in 1928.

He has taken a prominent part in all of the company's important litigation, being one of the principal attorneys in the big Lone Star Gas Company gate rate case, one of the largest rate cases ever tried in Texas.

Captain Mandel

HENRY J. MANDEL, Captain, Corps of Engineers, U. S. Army, returned to the service April 10, 1942 as Executive Officer, Post Engineer, Camp Lee, Virginia, and remained at that post until January 1943, when he was transferred to Post Engineer at Letterkenny Ordnance Depot at Chambersburg, Pennsylvania, where he is stationed at the present time. He also served in the commissioned ranks in World War I, overseas.

In civilian life, Capt. Mandel was manager of the gas heating department of the Metropolitan Edison Co., Easton, Pa.

A.G.A. Laboratories Honor Engineers

INAUGURATING a plan for the annual citation of employees for outstanding service, the American Gas Association Testing Laboratories on March 3 honored Kenneth R. Knapp, chief engineer, and William R. Teller, chief research engineer, as the first recipients of the honor.

The awards came as a complete surprise to both men at a reception given by the entire staff of the organization in the library of the Laboratories. Raymond M. Conner, director, made the selections and announced the plan at the reception, paying tribute to both men for the excellence of their work during the past year. Each was presented with a beautiful wrist watch on behalf of the entire organization. Other speakers were: Dr. F. E. Vandaveer, assistant director; Franklin R. Wright, manager, testing and inspection departments; Kendall H. Flint, assistant chief research engineer; and Milton Zare of the research department. After presentation of the gifts, refreshments were served.

Mr. Knapp, a graduate of the University of Pennsylvania in chemical engineering, has been employed in the gas industry for the past 33 years. He joined the Testing Laboratories in 1929 and has served as chief engineer since 1930.

Mr. Teller was graduated from Case School of Applied Science in 1927 with the degree of mechanical engineer. He joined the Laboratories in 1930 and is in charge of the war products department as well as the direction of research activities.

Australian Invitation

H. TINDALE, general manager of the Australian Gas Light Co., Sydney, has written the following letter to Major Alexander Forward, managing director of the American Gas Association:

"It has occurred to us as being probable that officers of your Association now serving with the U. S. A. forces may at some time or other find themselves passing through Sydney.

"Because we still retain happy recollections of the courtesy shown to our officers who visited the United States during 1933-36, we would like you to know that we shall be extremely glad to see any officers of your staff and do what we can to make their stay pleasant, if they care to get in touch with me."

Laboratories' Alumni Gather at Meeting

A "baker's dozen" of former employees of the A. G. A. Testing Laboratories hold a reunion during the Technical Conference on Domestic Gas Research, held Feb. 17 and 18 at the Statler Hotel, Cleveland. Pictured here are, left to right, standing: Richard Hall, Cribben & Sexton Co., Chicago; Tom S. Baker, W. J. Schoenberger Co., Cleveland; J. A. Leighton, Cribben & Sexton Co., Chicago; N. J. Reiff, W. J. Schoenberger Co., Cleveland; D. M. Mosteller, National Radiator Co., Johnstown; Russ Miller, Airtemp Div., Chrysler Corp., Dayton; C. R. Lawrence, Atlanta Gas Light Co.; and G. A. Short, Hotstream Heater Co., Cleveland. Sitting: N. L. Miller, Detroit Michigan Stove Co., Detroit; Russ Heywood, Bastian-Morley Co., La Porte, Ind.; John Corsiglia, Surface Combustion, Toledo; and A. F. Craver, Patrol Valve Co., Cleveland. Also at the conference but not in the picture was John Farren, chief engineer, Ruud Water Heater Co.

L. E. Dequine in New Jersey Central Post

L. E. DEQUINE has been appointed general superintendent of gas operations for the Jersey Central Power and Light Co., taking over the duties of John D. Alden who retired from the company March 1, according to Harold P. Richmond, superintendent of operations for the company.

Mr. Dequine has been with the company for thirty years, starting as general superintendent of the Consolidated Gas Co. with his office in Long Branch. He began his utility career in 1910 with the Madison Gas and Electric Co. at Madison, Wisconsin.

Since 1928 he has been assistant to Mr. Alden, with headquarters at the company's Long Branch Plant, but he will now be located at the general offices in Asbury Park.

Mr. Dequine developed his engineering interests early, working in the construction of the Panama Canal, before attending the University of Wisconsin, where he graduated as an engineer. He is a licensed professional engineer, and holds a gold seal certificate as a stationary engineer.

Miss Stewart Retires from A. G. A. Staff

MISS NELLIE F. STEWART, for many years head of the stenographic department of the American Gas Association, retired from active duty April 1. She had completed more than 25 years of Association work, having joined the A. G. A. staff on January 14, 1919, less than six months after the present Association was formed as a result of a merger of the American Gas Institute and the National Commercial Gas Association.

Countless thousands of mailings to gas companies and individuals throughout the industry have been prepared under her direction. In the course of her supervision of the stenographic department, she has trained hundreds of young girls in stenography—many of whom have advanced to fine positions in industry. She has retained the respect and admiration of all who knew her.

Pickard Elected

B. F. PICKARD, president, Interstate Power Company, has been elected president of the Iowa Utilities Association. He succeeds George A. Neal of the Iowa Public Service Company, Sioux City, Iowa.

Fuel Coordinator

L. W. CRUMP, industrial sales manager, Oklahoma Natural Gas Co., Tulsa, has been appointed by Secretary of the Interior Harold L. Ickes as coordinator in the Tulsa area of the nationwide campaign to save coal, fuel oil, gas and other fuels.

Deep in the Heart of Texas

THERE'S a lusty pioneer spirit still rampant in Texas. If you don't believe it just read the following letter from a small gas company operator which was written on the reverse side of an A. G. A. statistical report:

"I have only three sons and two sons-in-law; they are all in the armed forces. I am 62 years old and thought I had retired.

"I, with one other man, am operating the well from which we get gas, 55 miles of transportation system, and distributing systems in four small villages. We read 484 meters, 75 of which are way out in the country—first one place, then another. Our towns are scattered over the 55 miles from well to furthest town. I get out, chase trouble, move meters, check them out, and do all my bookkeeping.

"Sorry, but just don't have time to make all this report.

"P.S.—Forgot to say we farm 640 acres in grain. Our farm is 100 miles from our gas company office. We sold 17,560 bushels of wheat the past two years. One son helped on this wheat farm; he is now in the Navy—just turned 18 years. We work 12 to 18 hours per day. You either work, go to war, or get run out of Texas."

You can't lick a country with men like that!

Non-Tested Appliances Subject of Bulletin

A BULLETIN warning against the sale and use of non-A. G. A. approved gas appliances was issued on February 16 by the sales department of the Southern California Gas Company.

Addressed to gas appliance dealers, distributors and manufacturers of gas appliances, the bulletin calls attention to the shortage of many familiar types of gas appliances in that area, resulting, it is stated, in the presence on the market of a few appliances which are not suitable for installation locally without certain changes.

It is suggested that dealers can be sure any appliances they buy for resale are suitable for local installation if the appliances in question bear the A. G. A. Blue Star Seal of Approval for natural gas. Such appliances have been tested and will operate satisfactorily.

Portland Gas Sets New Records

WARTIME demands for Portland gas and by-products supplied by The Portland Gas and Coke Co. during 1943 were exceeded only by the efforts of members of the organization to meet those demands—a responsibility which was met by shattering many previous records.

Production of gas totaled 6,391,449,000 cubic feet, an increase of 12.3 per cent over 1942 and 43.2 per cent greater than the prewar year of 1941. This huge volume of gas was distributed to 99,509 customers, of whom more than 10,000 have been added since the outbreak of the war.

In the two years America has been at war, 181,000 tons of Gasco briquets were produced and delivered. This is almost equal to the production of the previous four years and means that manufacturing and delivery crews have broken some records themselves.

Gas Conservation

THE Ministry of Fuel & Power in the British Government distributes free of charge sets of thirteen fuel economy posters for display in showrooms, exhibits, etc. The posters are headed "How Mrs. Housewife Saves Fuel for Battle."

The Ministry notified British public utilities in February of their proposal to produce ungummed printed slips for distribution free of charge to gas and electric companies for enclosure with their quarterly accounts worded as follows:

"The Ministry of Fuel and Power is alarmed at the increase in the consumption of gas and electricity which is taking place in this area of supply. It is evident that consumers are not exercising the same economy in the use of these fuels as they did last winter. The need for economy is greater than ever, and we are most anxious to avoid a curtailment of supply. May we therefore ask you to exercise the strictest economy?"

The boys over there are fighting for you—will you buy more War Bonds regularly for them?

CONVENTION CALENDAR

1944

APRIL

Apr.	3-4	**Interstate Oil Compact Commission, Quarterly Meeting** Roosevelt Hotel, New Orleans, La.
	3-5	**American Society of Mechanical Engineers** Birmingham, Ala.
	5	**Mid-West Gas Association Annual Meeting** Des Moines, Iowa
	10-12	**National Association of Corrosion Engineers** Rice Hotel, Houston, Texas
	13-14	**Liquefied Petroleum Gas Association** New York, N. Y.
	18-19	**American Gas Association Distribution Conference** Hotel Statler, Cleveland, Ohio
	19-20	**Missouri Association of Public Utilities** St. Louis, Mo.
	26-28	**Gas and Electric Industry Accounting Conference** Cleveland, Ohio

MAY

May	1-4	**U. S. Chamber of Commerce** Waldorf Astoria Hotel, New York, N. Y.
	2	**Pennsylvania Gas Association Annual Meeting** Philadelphia, Pa.
	8-11	**National Fire Protection Association** Philadelphia, Pa.
	11-13	**Natural Gas Spring Conference, American Gas Association** French Lick Springs Hotel, French Lick, Ind.
	15-16	**Indiana Gas Association** Hotel Lincoln, Indianapolis
	15-18	**Natural Metal Trades Association** Hotel Biltmore, New York
	19-20	**Gas Meters Association of Florida and Georgia** Miami Beach, Fla.

JUNE

June	6-7	**American Gas Association Joint Production and Chemical Committee Conference** Hotel Pennsylvania, New York, N. Y.
	6-8	**Public Utilities Advertising Association** Palmer House, Chicago
	6-8	**Southwestern Gas Measurement Short Course** University of Oklahoma, Norman, Okla.
	8	**Canadian Gas Association 37th Annual Convention** Royal Connaught Hotel, Hamilton, Ontario
	8	**American Management Association Annual Meeting** Hotel Pennsylvania, New York, N. Y.
	19-22	**American Society of Mechanical Engineers** Pittsburgh, Pa.
	27	**American Gas Association Conference on the Operation of Public Utility Motor Vehicles** Hotel Bellevue-Stratford, Philadelphia, Pa.

OCTOBER

Oct.	3-5	**National Safety Congress** Sherman, Morrison & La-Salle Hotels, Chicago, Ill.

AFFILIATED ASSOCIATION *Activities*

Oklahoma Gas Meeting

L. A. FARMER, president, Northern Oklahoma Gas Co., Ponca City, Okla., was elected chairman of the Gas Division of the Oklahoma Utilities Association at the one-day conference of the Association held Tuesday, March 14, at the Biltmore Hotel, Oklahoma City. The conference consisted of a morning general session and afternoon meetings of the gas and electric sections. E. C. Jouillian, president, Consolidated Gas Utilities Corp., and president of the Association, presided at the general session. The Gas Section was presided over by A. F. Potter, District Manager, The Gas Service Co., Bartlesville, Okla., and vice-president of the Oklahoma Utilities Association.

"Postwar Planning To Maintain Gas Load" was the theme of an address by Cy Young, The Gas Service Company, Kansas City, Missouri, who warned the gas industry of the intensive competition which it will face from the electric industry for the postwar cooking load. He expressed the belief that superior performance as well as superior selling of fuels and appliances will have a more important bearing upon public acceptance and public desires than price differentials.

Need for Aggressiveness

He urged gas men to get on their toes if they would hold and increase the gas cooking load they have enjoyed during the past. He expressed the belief that greater inroads may be made upon the gas cooking load by the electric industry, but added the viewpoint that the gas industry may be expected to make far greater inroads into the refrigeration market than ever before.

He advocated greater attention to the question of providing separate deep freeze units for home use by the gas industry. Further standardization of models and reduction of number of models in the range field also were advised by Mr. Young.

Under the title "There Ought To Be a Law," Carl H. Dean of Oklahoma Natural Gas Company at Tulsa, proposed that the gas industry sponsor legislation to reduce hazards from improper ventilation and noxious gases resulting from improper combustion. He announced that the Oklahoma State Health Department had promised full cooperation toward such an effort.

Mr. Dean's subject provoked active discussion of various questions involved. Difficulties of enforcement of laws requiring proper venting of gas appliances and installation of ventilating means were pointed out by some members who cited lax enforcement of similar ordinances in many cities.

More intensive education of the public by the gas companies was proposed by some members in lieu of legislation. Despite divergence of views, however, the general consensus was that the industry should apply itself toward improving proper combustion by appliance adjustment and better venting of appliances.

"All Weather Air Conditioning" was the subject of a paper by John A. Gilbreath, assistant manager of the air conditioning division of Servel, Inc., of Evansville, Indiana. Mr. Gilbreath described in detail the new gas-fired all-weather air conditioning unit now in production by Servel and outlined the field that it opens up to the industry for additional year-round load.

The session closed following an announcement of the 1944 Southwestern Gas Measurement Short Course by W. H. Carson, Dean of the College of Engineering, University of Oklahoma.

Pennsylvania Natural Gas Officers

George E. Welker

GEORGE E. WELKER, president, United Natural Gas Co., Oil City, Pa., and past chairman, Natural Gas Section, American Gas Association, has been elected president of the Pennsylvania Natural Gas Men's Association for 1944.

Other officers are: vice-president—Dan S. Keenan, Carnegie Natural Gas Co., Pittsburgh; secretary-treasurer—B. H. Smyers, Jr. (in U. S. Service); acting secretary-treasurer—P. L. Kesel, Carnegie Natural Gas Co., Pittsburgh; and executive secretary—Mark Shields, 2619 Grand Building, Pittsburgh.

In addition to Messrs. Welker and Keenan, directors are: C. E. Bennett, E. J. Egan, H. D. Freeland, D. P. Hartson, J. H. Isherwood, J. J. Jacob, Jr., B. D. Phillips, H. H. Pigott, and S. C. Preston.

Southern Gas Meeting

A TWO-DAY streamlined war conference was held by the Southern Gas Association March 22 and 23 at New Orleans, La. Three general sessions and a number of sectional meetings were included. A strong program keyed to the theme, "Gas, Its War Task and Postwar Responsibility," was presented under the leadership of Frank C. Smith, president of the Association, and president, Houston Natural Gas Co.

Details of the meeting will be published in the May A. G. A. MONTHLY.

Florida-Georgia Gas Meeting May 19-20

THE Gas Meters Association of Florida-Georgia will hold its annual Spring meeting May 19 and 20 at the Roney Plaza Hotel, Miami Beach, Florida.

H. P. Thomas, People's Gas and Water Co., Miami Beach, is general chairman for the meeting. New officers will be elected and a varied program of gas topics presented.

John J. Barada, Safety Authority, Dies

JOHN J. BARADA, safety and employment director of the Laclede Gas Light Company and noted safety authority, died March 11, following a heart attack suffered as he was driving his automobile.

Death came to the 50-year-old World War I veteran, associated with his firm 33 years, under circumstances strikingly similar to thousands of emergency cases handled by the Laclede Gas Light Company inhalator squad, of which Mr. Barada was supervisor for 12 years, before it was abandoned in 1935. The sudden attack obviated use of the lifesaving device he had promoted.

Mr. Barada was district chief of the National Committee of Manpower in War Industries, United States Department of Labor. A Sergeant in the famed Twelfth Engineers in the last war, he had been secretary of the Twelfth Regimental Association since its organization. He was a Major in the Corps of Engineers Reserves, a charter member and past commander of Aubuchon Dennison Post 186, American Legion, and recently retired as president of the Missouri Forty and Eight.

He is survived by his widow; a daughter, Miss Dorothy Barada and a son, Air Cadet John, Jr.

Coke Byproducts

FINAL statistics on production, sales, value and stocks of coke byproducts for the years 1941 and 1942, including trends in production, have been released by the U. S. Bureau of Mines in Mineral Market Report M.M.S. No. 1150.

Gas and Electric Accountants To Meet in Cleveland, April 25-27

GAS industry accountants will meet again this year with those of the electric industry in an annual Spring conference which will take place Tuesday, Wednesday and Thursday, April 25-27 at the Hotel Cleveland, Cleveland, Ohio. O. H. Ritenour, Washington Gas Light Company, Washington, D. C., and F. B. Flahive, Columbia Gas & Electric System, New York, will act as co-chairmen. J. French Robinson, president, The East Ohio Gas Co., and vice-president, American Gas Association, will welcome the delegates at the first session.

Continuing a series of conferences which has extended over several years, the program will include many national accounting authorities and will embrace a large number of pertinent wartime accounting and personnel problems. Those who attended previous conferences do not need a reminder of the value of discussion of mutual problems which the get-together affords, nor of the results obtained from the exchange of solutions and procedures.

Final details of subjects and speakers remain to be determined; however, in general the program will be as follows:

General Session

The conference will open with a general session which will convene at 2:00 P.M., Tuesday, April 25. Subjects for this meeting will be of a general nature and of interest to all accountants. Among the topics to be handled by prominent speakers will be:

Problems Facing the Accounting Officer
Developments in Wage and Salary Stabilization
Personnel Problems
Making Good with the Customer.

O. H. Ritenour

F. B. Flahive

Group Meetings

Wednesday morning at 10 o'clock the General Accounting Activities Group and the Customer Activities Group will convene in separate meetings to consider specific problems relating in general to these two branches of the accounting departments.

The General Accounting Group have listed for preliminary study at this session:

Employee Manuals
Pension Plans
War Taxes
Amortization

The Customer Activities Group have listed:

Wartime Billing Plans
Bill Forms and Reforms
Job Training
Collections
Customer Relations
Paying Habits

It is planned, this year, to present more than the usual number of subjects at the general session and group meetings, without the usual discussion. Wednesday afternoon and Thursday morning smaller groups will meet wherein the subjects so presented may be discussed in detail by those interested.

The conference will close Thursday with a general luncheon for all attending, which will be addressed by a prominent speaker.

Final programs will be in the mail in the near future.

View of 1942 Accounting Conference in Cleveland

CP Gas Range—Postwar Spearhead

By E. CARL SORBY

Vice-President, George D. Roper Corp., Rockford, Ill.

E. Carl Sorby

IN the CP gas range we have the magic scepter with which to take advantage of all the favorable factors which will appear in our national scene after the war.

You are familiar with the fact that the acceptance of the CP gas range increased by leaps and bounds after its appearance in 1938 until production was discontinued at the start of the war.

You have heard that the average nation-wide prewar selling price of the CP gas range was $125. You know that the CP program exerted tremendous influence toward increasing the average unit selling price of all ranges to $70. Your own experience has proven that since the start of the CP program, the sale of heat control ranges has increased 141%.

CP Wartime Activity

Your CP gas range committee has maintained an aggressive flow of activity throughout the war period. Many of the ads appearing over the American Gas Association signature have emphasized the CP seal of Certified Performance. Trade paper ads have appeared regularly in order to maintain the enthusiasm of the companies and of the individual salesman who in peacetime did such a splendid job of placing this outstanding unit in homes throughout the nation.

With the approach of the termination of the war your CP committee has felt that CP gas range activity should be further stimulated.

A program recently announced has as its objectives:

1. The sale of War Bonds now.
2. Providing jobs for returning men in service.
3. The sale of CP gas ranges after the war.

A plan has been worked out whereby prospective CP gas range customers will be urged to purchase and earmark $100 to $150 extra in War Bonds especially for the purchase of a CP gas range when once again production is resumed. The plan is flexible so that the individual dealer or utility company can tailor it to his own particular needs and desires.

War bond folders, envelope inserts, large window posters, radio spot announcements and many other materials have been made available by the Association of Gas Appliance and Equipment Manufacturers, 60 East 42nd Street, New York 17, New York. These materials may be secured upon request.

An energetic advertising program is being carried out in Architectural Forum in order to reach architects, builders, building material dealers and others who will have considerable influence upon the person who will be building in the postwar period.

Attractive and hard-hitting trade paper advertisements developing the current CP theme will appear regularly in leading magazines reaching utility companies, hardware stores, furniture stores, department stores, dealers, in fact all those interested in appliance merchandising.

Several manufacturers are moving ahead with national advertising featuring the CP seal, designed to maintain the basic interest which has been built up in the mind of the housewife.

The CP gas range of the future, as in the past, will be the smartest in design, the most complete in features that has ever been offered to the American public. It truly will be the cooking marvel of the age, the ideal unit to convert gas, the fuel, into an outstanding cooking service.

Robert Stewart, of Sanitary Supply Co., Avon, N. J., gas appliance dealer, tells Oscar Wells, of Jersey Central Power and Light Co. (left), how CP Business Building Plan is helping him line up postwar CP gas range sales. In the background is the CP display poster available to all dealers

Advertisement in April Architectural Forum

The CP gas range will stimulate activity on the part of the entire gas industry. It will help sales management to plan more soundly and more boldly. It will act as the ideal unit for home service to use in visually demonstrating the superiority of gas. It will prove itself the serviceman's friend.

The Certified Performance gas range will increase the average sale price of all gas ranges sold. It will assure a wider margin of profit for dealer and utility alike.

It will protect the cooking load and effectively counteract the efforts of competitors featuring units requiring other fuels. It will stimulate utility-dealer cooperation to the advantage of utility, dealer, manufacturer and consumer.

Furthermore, the CP gas range of the future will be far more than the answer of an industry to its own needs. It will be the means of providing more sales jobs for returning men in service. It will be the means of providing more production jobs for many war workers who have contributed so much in fashioning the implements of war.

It will be the means of providing a rock bottom foundation upon which wartime savings may be placed for the good of the family and the nation. It will offer a

means of improving the future health of the family and thereby building an even more rugged, aggressive America.

She'll be coming 'round the mountain soon. And when she comes, she'll be coming fast. Let's not be asleep at the switch so we find the CP gas range Opportunity Express has already rolled by before we make plans to board her.

Wins Security Award

THE U. S. Office of Civilian Defense announces that the National Security Award has been granted to 20 additional plants and facilities in eight different states. Among them was the Cincinnati Gas & Electric Co., Cincinnati, Ohio.

Equipment Center In Rochester

THE Equipment Center on the main floor of the Rochester Gas and Electric Corporation's building, manned by the Home Service Department, is fulfilling an important wartime function in providing useful equipment and servicing information. In addition, it serves as a general information center where all types of questions are answered by the home service girl on duty.

There are many requests for recipes and information on food. Then there are many customers who want to buy new or used equipment. These customers require special handling. Many customers ask where to pay bills, where to sign up for new service, and where to go with a complaint.

The care of ovens and burners of ranges seem to be one of the most important problems at the present time. Then too, the repairing of old equipment gets its share of attention.

In so far as it is possible when a question is asked, the customer is actually shown how to do the job. For instance, both a modern and an old-type range are used. In this way the burner can be taken apart and all the steps in cleaning shown. This seems to be very helpful.

McCall Home Service Award

ATTENTION is called to the competition in the gas utility home service departments for the awards in the McCall Magazine Contest announced for the fourth consecutive year.

Cash prizes with plaques or certificates will be made to the five home service directors or directing heads of home service departments of those gas companies in the United States and Canada which have, in the judgment of the Jury of Awards, submitted papers which indicate outstanding contributions to the war effort as outlined herein.

Prizes

First prize—To the Home Service Department—a Plaque on which the name of the winning department and company will be engraved each year. The original Plaque will remain in the possession of the winning department for one year.

A *duplicate* of the Plaque will be presented to the winning department for permanent ownership. To the Home Service Director or Directing Head of the Home Service Department an individual prize of $150 in War Bonds and Stamps or cash is to be awarded.

Second prize—To the Department—a framed Illuminated Parchment for permanent possession; to the Director or Directing Head, $100 in War Bonds and Stamps or cash.

Third prize—To the Department—a framed Illuminated Parchment for permanent possession; to the Director or Directing Head, $75 in War Bonds and Stamps or cash.

Fourth prize—To the Department—a framed Illuminated Parchment for permanent possession; to the Director or Directing Head, $50 in War Bonds and Stamps or cash.

Fifth prize—To the Department—a framed Illuminated Parchment for permanent possession; to the Director or Directing Head, $25 in a War Bond and Stamps or cash.

Basis and Merit Rating

The entrants will submit three copies of a report of 2,000 words or less (with one copy of any appropriate photographs or illustrative material pertaining to the results if desired) covering the following four classifications, to which the indicated weighted merit rating will be given by the judges—

1. The planned 1943-1944 Wartime Program of the Home Service Department. 25 points
2. Activities to further better living through care and use of gas household equipment; to further Government nutrition and food programs; other activities to maintain good-will. 15 points
3. The actual progress made in accomplishment of these objectives in the period of June 1, 1943, to May 31, 1944. 50 points
4. Summary of accomplishments of the average Home Service worker in this period (this summary shall be arrived at by dividing the total accomplishment of the department in each activity by the average number of workers). 10 points

The combined ratings are designed to place large and small gas utility home service departments on an equal footing, in competition.

Filing of Reports

The contest period will cover the period of June 1, 1943, to May 31, 1944. Entries should be addressed to McCalls Magazine Awards, c/o American Gas Association, 420 Lexington Avenue, New York 17, N. Y., not later than midnight of July 1, 1944.

Left—Equipment center of the Rochester Gas and Electric Corp. which is manned by the Home Service Department. Right—A floor display of the Rochester company which points out to passers-by the variety of foods for the table which can be made from canned vegetables

What Do the Colleges Think of Gas Equipment?

By ROBERT C. LEMAY

Industrial Engineer, The Connecticut Light & Power Company, Waterbury, Conn.

Robert C. LeMay

A RECENT advertisement in a gas trade magazine was built upon the old adage that "great oaks from little acorns grow." Today's discussion is based upon the belief that "large industrial customers from engineering students grow." The war has brought this home forcibly to us.

During the recent rapid industrial expansion all types of engineering graduates were very much in demand, and particularly those with metallurgical knowledge. After a few months of this unprecedented expansion with its resulting changes, our customer personnel lists no longer served effectively as "who's who." Consequently when we called to sell gas for the new war requirements, we frequently found that our old friend in that plant had been transferred, and that the responsibility for the new heat-treating department was in the hands of someone else. "Someone else" often turned out to be a young engineer who hadn't been long out of college, and who, because the "old timers" were needed for other assignments, had been given the responsibility for assembling quotations and making recommendations for the new heat treating equipment.

When New Engineer Takes Over

Let us recall how this new man began to carry out his assignment. He was anxious to do a good job, of course, and wanted to buy equipment which he considered to be modern. He wasn't particularly concerned over price or operating costs, probably because he hadn't been around in mid-depression days when every dollar counted. Perhaps his only acquaintance with gas-fired equipment was with whatever happened to be in his company's old hardening room, and with the gas furnaces installed in the college laboratory where he had studied heat treating. He undoubtedly had some knowledge and perhaps also some experience with competitive equipment, for most college laboratories employ it, while trade publications do not overlook its advantages. Under these circumstances he may have concluded that gas equipment was in general out of date, and that gas was not the modern fuel which he wanted to use. I know that this story is not pure fancy. It occurred in our territory more than once, and probably also in yours.

When an individual is faced with the necessity of making a fairly prompt decision on any matter, he is often decidedly influenced by any preconceived ideas or prejudices which he has. New college graduates seldom believe that gas is the most modern industrial fuel. I did not, and in the twelve years since graduation I have visited other college metal-treating and assaying laboratories without ever seeing anything which would make me prefer gas as an industrial fuel.

Occasionally in recent years we have heard of gas equipment installations which brought trade school or college laboratories up to date. Wartime experience in dealing with recent graduates, however, has indicated that the situation would bear investigation. Obviously, to pursue such an investigation, a complete survey in each of the colleges with approved metallurgical courses would be desirable. Because of a desire to save man hours, however, and because it was believed that a good cross-sectional picture would be almost equally valuable, it was decided to ask each member of the Industrial and Commercial Gas Sections' Managing Committee to secure the desired information from those technical institutions in the areas which he served. The surveys which were returned were quite well done, and as a result we have a fairly clear picture of the conditions which exist in sixteen representative schools and colleges. No effort was made to select progressive or non-progressive institutions, or to influence the picture in any way.

The information which is given here has been taken from tabulated data on more than one hundred pieces of high temperature equipment. This includes chiefly furnaces used for metal heat-treating, melting and forging, although enough information was received on low temperature units to enable us to comment on them as well. These latter appliances include steam boilers, ovens, torches, tank heaters and special burner applications, as well as the usual bunsen burners and hot plates. The information can be summarized as follows:

1. Gas and electric equipment predominate, with coal firing used for special heat applications. No oil-fired furnaces were reported.
2. The average age of the gas furnaces is 16 years. The average age of the electric furnaces is 8 years. Even more significant is the mean age figure. The mean age of the gas furnaces is 18 years, and of the electric furnaces, 5 years. This indicates that for every new gas furnace there is one about thirty years old, and for every gas furnace five years old there is one about 25 years old, and so on.
3. While the majority of electric heat-treating furnaces have automatic temperature control, few gas furnaces are so equipped.
4. Most of the gas furnaces are without insulating refractory linings and without automatic air and gas proportioning devices for combustion control.
5. A small proportion of the furnaces are homemade, both gas and electric. The oil drum seems to be a favorite type of furnace shell in these cases.
6. Only two gas-fired furnaces have any semblance of separate atmosphere control, and these employ diamond blocks. The electric tool hardening furnaces include almost every type now sold, and some of these are equipped with external atmosphere generators.

Presented at American Gas Association War Conference on Industrial & Commercial Gas, Rochester, N. Y., March 30-31, 1944.

Rochester Conference

THE 1944 War Conference on Industrial and Commercial Gas, sponsored by the American Gas Association, was held March 30 and 31 at the Hotel Seneca, Rochester, N. Y., after this issue of the "A. G. A. Monthly" had gone to press. A complete report of this meeting will appear in the May issue.

In addition to Mr. LeMay's paper, starting on this page, an outstanding conference presentation on "New Horizons for Industrial Gas" by Carroll Cone, Surface Combustion, appears elsewhere in this issue.

7. Fewer than 25 percent of the gas furnaces are satisfactory modern units. Because of this fact, it was definitely established that it is usually the electric furnaces which are employed where both types are available.
8. Low temperature gas equipment is generally more modern, is in somewhat better condition than the gas hardening room equipment, and is better liked. There seems to be a desire, however, for something more modern and better looking in the way of gas fired hot plates.

Perhaps the most significant part of this investigation is the remarks which were sent in both by the investigators and by the institutional representatives. Of course some of the gas installations are satisfactory. The best report came from Worcester Polytechnic Institute in Worcester, Massachusetts, where a splendid selling job has been done by our old friend Andy Huston. Other users were progressively less well satisfied, down to those men who thought that their gas furnaces were very poor. The most typical comment of instructors and professors was "They're O.K. for the present," or "They're better than nothing." Really favorable comments were few. Below will be found some of the more detailed statements, and these are selected not in an attempt to emphasize the picture already painted, but chiefly to permit a better understanding of the present thinking and future plans of those who use this heat-treating equipment.

1. *User:* "Would like to have more modern furnaces, built with insulating refractories and equipped with proportional gas-air mixers and automatic temperature controls. Have tentative plans for modernization in this department after the war."
   Investigator: "Existing equipment is no asset toward increased use of gas-fired heat-treating furnaces."
2. *User:* "Engineering students should have modern equipment at least equal to that encountered in actual industrial practice."
   Investigator: "I am in full accord with the above comments and am ever mindful of my erroneous impression of gas-fired furnaces which was imbedded in my mind when I attended the Engineering School of this same University some twenty years ago, and how amazed I was after entering the industrial gas field shortly after and found out the prominent place that gas holds in the industrial process field. In a recent talk which I made before the Mechanical Engineering students on the subjects of 'Gas Furnaces' and 'Gas Combustion Systems' I found the students and instructor intensely interested in the subject and feel that more talks of this nature in many of our universities will be both helpful to the students and to the gas industry at large."
3. *Investigator:* "Professor Johnson is a gas booster. He would use gas in preference to any other fuel."
4. *User:* "Heat treatment of metals is covered in classwork only, due to the condition of equipment."
5. *Investigator:* "There is satisfaction with gas equipment, taking into consideration its obsolescence. There is a desire for temperature control wherever feasible and for more modern equipment embodying new basic principles."
6. *Investigator:* "Bulk of laboratory assay work done in coal fired equipment (because it is quieter). Have muffles and firebrick on hand for gas furnaces and they are kept in good order. Heat-treating equipment added in recent years and some proposed new furnaces, all electric."
7. *Investigator:* "Although this department is fairly well equipped with gas-fired furnaces, there is considerable similarity in the type and size of furnaces, and they do not have one really modern gas-fired heat-treat furnace with combustion control and temperature control."
8. *User:* "The present gas equipment for heat treatment of metals in our shops and laboratories is somewhat obsolete and very limited in capacity but was sufficient for the past needs. The postwar industrial developments will doubtless make it advisable, if not essential, that we enlarge and modernize our heat treatment facilities."
9. *User:* "Bulk of experimental work being done in electric furnaces where very close temperatures are attained by potentiometer control. Ease of moving equipment from one laboratory to another is a consideration. All engineering students are grounded in the basic principles of each and all fuels, and no one fuel is favored."

We have just outlined the results of a survey designed to reveal what typical American colleges and technical schools think of gas equipment. This survey also shows that these institutions would like to secure more modern equipment (particularly high temperature furnaces) as soon as they are able to do so. It cannot be assumed that many of these will be modern gas-fired units of a quality which will make gas boosters from the thousands of postwar students. That is, not unless we decide to do something about it. Just to conclude that this is the responsibility of the local industrial gas engineer, or any other local agent is not enough. This is proven by the fact that unsatisfactory installations already exist, and the students who learned to dislike this equipment five years ago are now employed a thousand miles away, in your territory and mine. Thus the question at hand, therefore, seems to be clearly a national problem.

American Gas Association Industrial and Commercial Gas Advertisng for April

The National Advertising Committee of the Industrial and Commercial Gas Section, J. P. Leinroth, chairman, and F. B. Jones, vice-chairman, announces that full page advertisements will appear in the trade and business magazines listed below during the month of April. These advertisements are prepared in cooperation with the Committee on National Advertising as a part of the industry's national advertising campaign.

MAGAZINE	THEME
	General Manufacturing
BUSINESS WEEK (Apr. 22—⅔ page)	Fitting *GAS heat-treating* to each specific job. Industrial *GAS* engineers, once they know the problem, "reach into the file" for the right answer.
	Metals Industry
INDUSTRIAL HEATING THE IRON AGE (Apr. 6) METALS & ALLOYS STEEL (Apr. 17)	Modern *GAS heating* is a MACHINE TOOL! It fits right into the production line and is "tailor-made" for the jbo.
	Ceramic Field
CERAMIC INDUSTRY	Getting set for postwar operation? Check into how *GAS* equipment, drafted for war, is being improved for peace!
	Baking Field
BAKERS WEEKLY (Apr. 10)	This war has been a "PROVING GROUND" for *GAS baking!*
	Restaurant Field
HOTEL MANAGEMENT AMERICAN RESTAURANT	Now—Cooking is more of a science than ever! *GAS cooking* is proving itself brilliantly despite adverse wartime conditions.
	Institutional Field
INSTITUTIONS (Apr.—2/9 page)	Getting set for postwar operation? Check into how *GAS* equipment, drafted for war, is being improved for peace!

What are we going to do about it? I do not know. Combination utility companies will usually agree that in general gas is more difficult to sell than electricity, and here we have one of the hurdles which make gas harder to sell. The object of this address has been to point out these things. If there are enough gas men who believe that there is sufficient necessity for further positive action on this matter, we will feel repaid for our efforts to date.

The Engineers' Council for Professional Development in 1942 listed thirty-one American colleges and engineering schools with approved metallurgical courses. A plan to place modern gas-fired equipment in these schools should be within our ability to execute, and should result in a generation of metallurgists who will be invaluable to us, because of their assistance in future industrial gas sales. Obviously, to replace all unsatisfactory gas-fired equipment in all of these institutions would be too ambitious a project, but it should be possible to install, in nearly every one of these schools enough of the best gas-fired equipment to permit our fuel and our equipment to create favorable impressions.

The problem resolves itself basically into two parts—how to get the necessary money, and then how to spend it. A set of furnace standards would have to be written for this purpose, of course, to assure the fact that our real object would be fulfilled. Information already volunteered indicates that gas equipment manufacturers with decreased production might be willing to sell equipment which meets these standards, at reduced prices, and some arrangement whereby our industry and each educational institution shares the balance of the costs, would make this project a reality.

Gas Air Conditioning Training School

MOVING into the third phase of the postwar action program on the All-Year Gas Air Conditioner, Servel, Inc., during February held a training school at the factory for application, service and sales engineering representatives of gas utility companies from all over the country. More than 50 engineers attended.

"The purpose of this series of meetings" John K. Knighton, sales manager of Servel's Gas Air Conditioning Division, said, "is to thoroughly acquaint members of the gas industry with the problems of application, installation, and servicing of the new unit. On February 21 another week-long school will be held for a much larger group to cover the sales question."

This phase of Servel's program will prepare men to form skeleton sales and service staffs throughout the nation. "When wartime restrictions of manufacturing have been lifted the Servel Gas Air Conditioner will be ready for market," Mr. Knighton said.

Mr. Knighton estimates that 3500 men will be needed in the field by utility companies to handle sales, application, installation engineering and servicing exclusively.

"Commercial Gas" in New Format

THE magazine "Commercial Gas," published by Fenton Kelsey Co., has adopted a new format and different editorial approach. Issued bi-monthly, the February number appeared in the handy pocket "Reader's Digest" size. Its editorial policy is explained in the statement: "Commercial Gas plans to be increasingly a 'ways-and-means' text book—a get-together forum—a question-and-answer department of the gas industry."

Lead article for February is an extract from Roy E. Wright's A. G. A. Food Service Committee report entitled "Say They'll Drive Us Out of the Kitchen."

FUNDAMENTAL RESEARCH

(Continued from page 154)

ducing an improved appliance today but to continuously meet the competition of other equipment and the challenge of other industries?' Keeping in mind these four principles, it seems to me there are a number of deductions that follow, and to which I should like to call your attention.

"It is my belief that the gas industry should not take the direct responsibility for research. Granted that if the manufacturers do not do it the utilities or the gas industry must, but that is evidence of a weakness, not the development of an asset. The utilities should do everything they can to encourage and augment research, to supplement it where necessary. This does not mean they should not appropriate money for research. They should—but use it to stimulate the research expenditures of others, not as a substitute for it. The objective of the Domestic Research Committee or of A. G. A. should not be to gather all research unto itself, like the development of a one-man organization, but to develop and encourage the contributions of others."

In fairness to Mr. Adams it is incumbent upon me to say that he then went further in proposing that the greatest amount of research would be best produced for the industry as a whole if association funds were to be expended to assist manufacturers directly in carrying out certain investigations. While it is not entirely clear to me just what procedure would be most fruitful, I am constrained to agree with Mr. Adams only in very special cases, which I will not enlarge upon here. It is my conviction that the work we have been doing is in the right direction, because we have such a large amount of catching up to do. We probably have some years of work before us to fill the great gaps in our technology of gas utilization. It may surprise no one here, but it certainly surprised me to learn that we had to go back fifty years to find the last work which had been done on certain phases of the technology of combustion. Furthermore, we stumble into the realm of the unknown in the simplest applications of burner design, determinations of heat distribution, burner operation with all primary or all secondary air, as well as in many other fields.

Some hold the opinion that when we finish with an investigation that the job is done, and that anyone can put the information to work simply by reading bulletins. Such is far from the fact. Instead, these data can become useful only by employing the brains and ingenuity of trained technical personnel to apply them in the appliance field itself. The actual application of this basic technologly to the appliances themselves leaves the widest range for ingenuity, craftmanship and manufacturing skill.

It is common knowledge that many of our manufacturers have learned entirely new manufacturing techniques and precision methods. It is our purpose to provide you with much new basic knowledge in the field of gas technology. It is our hope that the same manufacturers will rely in greater degree than ever before upon their technicians to aid in applying that knowledge. Your technicians need the broadening contacts which can result from conferences of this sort. They should be encouraged to collaborate with the Technical Advisory Committees of the various research projects to the end that the greatest good will result.

On behalf of the Domestic Research Committee of the American Gas Association I urge your continuing interest in the research results, and wish you the greatest benefits in applying them to your own product.

Technical SECTION

CHARLES F TURNER, *Chairman*
L E KNOWLTON, *Vice-Chairman*
A GORDON KING, *Secretary*

A Practical System of Pipeline Marking

By J. B. LANCASTER

Philadelphia, Pa.

FOR many years, the usual method for the identification of the contents of pipelines has been to paint the lines various colors. The paint is applied to the lines themselves or in the case of insulated lines to the covering. This involves considerable cost and labor.

The writer has evolved a system of markings which can be applied to pipelines in the form of Decalcomanias. These are durable and easily applied and permit of numerous combinations which will enable any workman new or old to identify a line quickly and accurately as to their contents, pressures, etc. They are especially useful where new employees are being broken in to new duties requiring identification of lines.

Pipelines have been divided into five classes: Dangerous, Safe, Fire-Protection, Protective and Extra Valuable and lettered accordingly: D, S, FP, P, and EV. It becomes a simple matter to establish symbols to represent these classes so that they can be recognized from a distance. The symbol is of ample size to carry a printed description of the contents, its destination, whether it be suction or discharge, or any useful information regarding the line in particular. An arrow indicates the direction of flow in the line.

This system of marking pipelines can be explained more readily by observing the wall index shown in Fig. 1.

Markers Colored and Lettered

The symbols in the center of the marker are white, the name of the fluid is printed thereon: there is sufficient space also for any other incidental printing as may be desired such as: L.P., H.P., Suction, Discharge, Pipe Size, etc.

The four corner areas of the marker contain color; the upper left hand area is reserved for the Series Code and is explained as follows:

Green	Water
Red	Oil (Combustible)
Turquoise	Oil (Non-comb.)
Orange	Acid
Yellow	Gas (Non-comb.)
Vermilion	Gas (Combustible)
White	Syrup

The remaining three corner areas also contain color. The use of ten colors afford many combinations, quite a number of which have been selected in the code indexing for various fluids. Frequently the series color is duplicated in the opposite (lower right hand) corner for the purpose of color balance and simplifies cataloging as:

Green-White-Green-White indicates Plain Water.

Brown-Brown-Brown-Brown indicates Tar.

Some engineers prefer to make up their own color index, using the square or the circle for all their markers, and since the markers are hand made it doesn't make any difference as long as the main pattern is adaptable. The flexibility in the design of the markers permits deviation from the established coding, so that plants desiring to have their own color code used may do so.

The easiest, quickest, simplest and least expensive method of marking pipelines is by the use of Decalcomanias, which have been made to conform with the above description. The colors are fast and the texture durable.

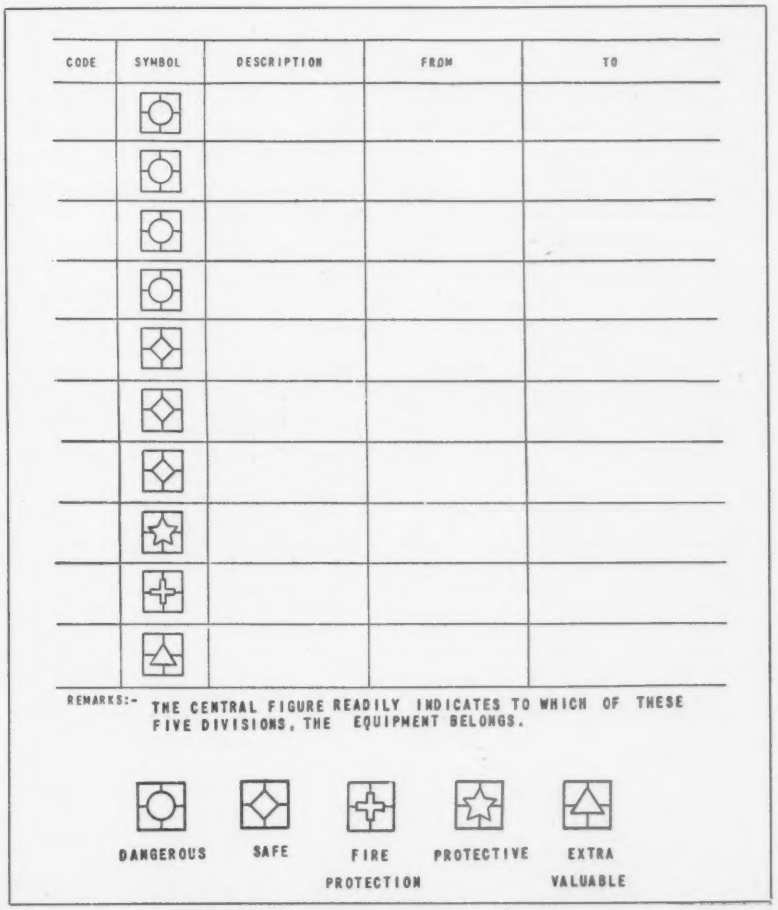


Figure 1. Wall index of pipeline marking

Distribution Conference To Take Place in Cleveland, April 28-29

A. C. Cherry

THE twenty-first annual Distribution Conference of the Technical Section of the American Gas Association will be held at the Hotel Statler, Cleveland, Ohio, Tuesday and Wednesday, April 18 and 19. Traditionally the distribution man's "event of the year," this conference is expected to match its predecessors in interest and value.

Under the leadership of A. C. Cherry, The Cincinnati Gas & Electric Co., chairman of the Distribution Committee, informative and stimulating sessions have been arranged covering both current and postwar topics.

Luncheon conferences will be held on both days and are under the direction of T. H. Kendall, Equitable Gas Co., Pittsburgh, vice-chairman of the Distribution Committee.

Robinson To Speak

J. French Robinson, president, The East Ohio Gas Co., Cleveland, and chairman, Natural Gas Department, American Gas Association, will welcome the delegates to Cleveland. Major Alexander Forward, managing director, A. G. A., will convey the Association's greetings to the delegates.

An innovation will be the merging of the two Tuesday afternoon luncheon conferences, April 18, at about 3:45 P.M., to participate in a discussion of a topic of vital interest to all operating men of the industry.

For Monday, April 17 and Thursday, April 20, the Association's Testing Laboratories have extended a cordial invitation for delegates to inspect the facilities devoted to research and testing. In addition, The East Ohio Gas Company has arranged for an inspection of their facilities for liquefaction of gas and storing it in liquid form for regasification and distribution when needed. Details of conducted tours to be arranged for the day immediately preceding and succeeding the conference will be included in the printed program. Every distribution engineer will find it well worth while to take advantage of this unusual opportunity to inspect these projects at first hand.

Following is the tentative program:

TUESDAY, APRIL 18

10:00 A.M.

Opening Remarks, A. C. Cherry, Chairman, Distribution Committee

Welcome, J. French Robinson, President, The East Ohio Gas Co., Cleveland, Ohio, and Vice-President, American Gas Association

Greetings, Alexander Forward, Managing Director, American Gas Association

A Message from the Association, E. R. Acker, President, American Gas Association

Safety Through Proper Driving Procedure, A presentation by the "Motor Vehicle" Committee, Linn Edsall, Philadelphia Electric Co., Philadelphia, Pa.

Mixed Gas Research, H. O. Loebell, Chairman, Mixed Gas Research Committee of the Natural Gas Department and the Technical Section, New York, N. Y.

12:30 P.M.

Round Table Luncheon Conferences

Luncheon No. 1

Pipe Coatings and Corrosion, R. F. Hadley, Chairman, Susquehanna Pipe Line Co., Philadelphia, Pa.

Luncheon No. 2

Work on Customers' Premises, J. M. Pickford, Chairman, Northern Indiana Public Service Co., Hammond, Ind.

3:45 P.M.

Combined Round Table Conference

Presentation and discussion of a vital topic of the day is planned for this Combined Round Table Conference, by a well informed speaker.

WEDNESDAY, APRIL 19

9:30 A.M.

Coatings Useful for Distribution Systems, K. H. Logan, National Bureau of Standards, Washington, D. C.

Progress Report on Technical Section

Studies of Post-War Problems, J. V. Postles, Chairman, Committee on Post-War Planning Cooperation, Philadelphia, Pa.

Post-War Distribution, H. B. Andersen, Chairman, Subcommittee on Economics of Distribution Design for Domestic Load Building, Philadelphia, Pa.

Post-War Appliance Design from the Servicing Viewpoint, J. M. Pickford, Chairman, Subcommittee on Work on Customers' Premises, Hammond, Ind.

Interim Report of Subcommittee on Cast Iron Pipe Standards, C. C. Jones, Chairman, The Philadelphia Gas Works Co., Philadelphia, Pa.

Subcommittee Reports

12:30 P.M.

Round Table Luncheon Conferences

Luncheon No. 3

Meters and Metering, J. H. Collins, Chairman, New Orleans Public Service Inc., New Orleans, La.

Luncheon No. 4

Construction and Maintenance, H. W. Nicolson, Chairman, Public Service Electric & Gas Co., Newark, N. J.

Joint Production and Chemical Conference

F. J. PFLUKE, Rochester Gas & Electric Corp., Rochester, N. Y., chairman of the Gas Production Committee, and V. J. Altieri, Eastern Gas and Fuel Associates, Everett, Mass., chairman of the Chemical Committee, both of the Technical Section, announce the program for the Joint Production and Chemical Committee Conference, to be held at the Hotel Pennsylvania in New York, N. Y., June 6 and 7, is well under way. Practical papers dealing with present and some postwar problems along with four timely Round-Table Luncheon Conferences have been arranged by A. C. Sedlachek, Philadelphia Coke Co., Philadelphia, Pa., and Louis Shnidman, Rochester Gas & Electric Corp., Rochester, N. Y.

The Association will be represented by President E. R. Acker and Major Alexander Forward, managing director, who will address the delegates at the first morning session. The chairman of the Manufactured Gas Department, George S. Hawley, Bridgeport Gas Light Co., Bridgeport, Conn., will open the second session.

Motor Vehicles Conference

THE chairman of the Committee on the Operation of Public Utility Motor Vehicles of the Association, E. W. Jahn, Consolidated Gas Electric Light & Power Company of Baltimore, Baltimore, Md., announces the committee has timed its Annual Conference to meet the day preceding the Philadelphia T and M meeting of the Society of Automotive Engineers, on June 27, 1944, at the Bellevue-Stratford Hotel, Philadelphia, Pa. Presentations of interest and help to company fleet operators are being arranged.

Essential Activities

THE revised list of essential jobs released February 25 by the War Manpower Commission contains the following:

"Heating, Power, Water Supply and Illuminating Services,—Electric light and power, water, and gas utilities; steamheating services; sewage systems; tree trimming for power and communication lines; water-well drilling; installation and servicing of liquefied petroleum gas facilities."

(Continued from page 147)

change in the existing rates or rate structure. The consideration for this viewpoint is prompted entirely by the psychological influence that a rate increase may have before any competitive picture is evaluated, rather than by the economics of the service or the earnings position of any company. In other words, any agitation for rate increase before the public knows what competitive costs will be may have adverse effect on the specific market. Each company must decide for itself the effect and the advantage of any rate changes now or in the immediate future.

Because this part of the discussion deals with new house heating that can be obtained from available equipment, the justification for a rate change exists only if the present rates do not cover the incremental cost of gas as produced today or will be produced in the near future.

Sales effort must be planned. This sales effort must be impressive enough to arrest the attention of every householder. It must reflect the viewpoint that the industry has decided that everybody can use gas for house heating. It must reflect the announcement of a new era of gas service, and it must reflect a new decision predicated on new accomplishment by the gas industry. For such a procedure, an adequate plan is needed, as well as ample manpower and funds with which to accomplish the purpose.

Capacity Increase Necessary

To summarize, the entire theme of the immediate, or short range, viewpoint of the house heating load in order to take on certain amounts of that business, is to increase the capacity of the facilities now available to their maximum capacity. The rates must be reviewed to be sure that they are compensatory, and the sales effort planned adequately. Let it be known that you are in the business to serve this load. The loads you acquire will not come on all at one time, anyway, and each step made in the above direction in itself is education and experience in what further steps can and must be taken to accommodate more business.

Before I go into the second suggestion for the long range viewpoint—that of dedicating ourselves at the outset to provide capacities ample to meet the complete demand—I would like to state that the scope of this presentation is too large to be covered in the time allotted to me. Hence, of necessity, I am forced to leave out of consideration many amplifications of viewpoints which belong in this discussion. I must therefore rely on the fact that all of you have read the large number of factual studies presented on the subject, and particularly the recent studies presented by the Market and Economic Research Committee, as well as the recently issued reports on Competitive Factors Affecting the Realization of Potential Markets in the Postwar Era.

The Long Range Viewpoint

I believe, and the facts will support me, that the specific problem the gas industry has in economically serving the public with gas for house heating is largely the fact that, since the gas industry has been based upon high load factor operations, we haven't the equipment or the facilities to economically produce gas that is sold at low load factors. Hence the problem of production for low load factor business is relatively new. As previously stated, the distribution of gas with low annual load factor, but with high daily and hourly load factors, is not a serious handicap, nor does it mean unduly expensive service. Therefore, the only elements of service cost which vitally affect the low load factor service are the production equipment costs.

Hence, as a prerequisite to the solution of this problem, we must carefully examine the elements of cost that make up this investment in production plant. To accomplish this requirement we can do two things: First, study the equipment available now, with the thought of reducing its cost to the lowest point possible; second, from this study formulate an objective, or set up the ideal plant, that would meet the problem of low initial investment.

The manufacturing equipment now in use is either the coal carbonizing plant, using a variety of methods and design, or the carburetted water gas machine. The coal carbonization plant, because of its high initial cost and because it must of necessity dispose of the coke produced at a premium, is generally unfit to meet the economics of house heating, save in those rare cases where the coke goes entirely to the industrial market. Hence the carburetted water gas machine is the only gas-making equipment that more nearly meets our needs.

The parts that make up a carburetted water gas plant consist of buildings, holders, boilers, exhausters, blowers, piping, coal handling, scrubbers, coolers, purifiers, etc., in addition to gas production sets. The gas-making apparatus as such seldom exceeds more than 15% to 20% of the total costs.

I suggest that every one of you itemize the cost of your plants to reflect each function, and see how they can be reduced or possibly eliminated, so that the total cost is lowered.

The thinking behind such an analysis must not be thinking prompted by what has been past practice but—and this is vitally essential—thinking based on the principle that because it has not been done before, it is not necessarily impossible now. In this connection we may recall that there was a time when we even housed the holders, for what reason I do not know. Nevertheless, it is a point to remember, and if the past had its reason, the future may not.

Value of Plant Analysis

At any rate, such minute analysis of equipment costs will do two things: It will show what can be done to reduce the cost of the water gas machines, and it also will crystallize the ideal gas-making machine for the industry. In line with this thought, I have already been assured by engineers representing large utility companies that stripped water gas plants for peak gas production can be installed at approximately only one-half the cost of the standard water gas machines. For faster progress, it may be well to invite manufacturers of water gas machines to help with this problem or, if feasible, put the problem up to manufacturers of other equipment.

In order to be specific about what I have in mind, let me state what I believe our new gas-making equipment must embody:

It must be an outdoor production unit that has a self-contained steam generator, thereby eliminating most of the buildings and the boiler plant. It

must operate continuously and generate gas under pressure, thereby eliminating some holders, exhausters and compressors. It must reflux the unchanged raw fuel to reduce scrubbing and cooling to a minimum. The functional characteristics of such a plant should be similar to a plant handling fluid material, so that it can be operated automatically with a minimum of labor. And lastly, it should use the lowest cost raw material available.

This ideal plant can serve as a pattern for improvements required in the water gas machine if the water gas machine is adaptable to these changes. If not, there is no alternative but to start from scratch and develop gas-making equipment that would incorporate all, or the major portion of, these desirable characteristics.

This, you may say, represents the millennium. It may look impossible to some of you and absurd to others. Nevertheless, is represents our objective—the objective of the gas industry if it is to fulfill its function completely and deserve the opportunity that the house heating business offers.

Recommendation

It is purely an anticlimax to propose that the industry needs research in the direction mentioned. Suggestions along this line, some of mine among them, have never enjoyed too ardent support from the technical representatives of our industry. However, purely because I am convinced—and I know that most of you will agree with this conviction—that the gas industry needs a less costly production plant, and that research in this direction is accordingly vital to the industry, I am voicing the opinion that the current viewpoint toward research needs readjustment. This is not intended as a reflection on the industry's fine group of technical men. I am stating it solely because I believe that an inhibited viewpoint precludes not only adequate research itself, but even the decision to inaugurate it. Our ultra-conservatism is the most serious handicap we have.

Therefore, my recommendation is that you must decide whether you will dedicate some activity in this direction without measuring the desirability of such research by the unknown elements it represents, but with the frankly avowed purpose of boldly seeking the ultimate—the ideal—if you please. We must work towards that ideal, and in this effort we will learn the limitations of our concept and reorient ourselves into the proper channels. We may not achieve our ideal. But in our search for it we will broaden our experience, acquire new knowledge, and gain the advantage, so that steps we take will be towards our goal.

I am too old not to be conservative. But I am not old enough to think that we have explored all the opportunities for improvements in the making of gas, or know all the reasons why it cannot be done.

If these thoughts appeal to you, and you decide to do something about it by taking action, I am sure that a renaissance in the gas industry is bound to come. With it the elements of frustration, loss of prestige, and the feeling of being antiquated will leave the industry. In its stead will come a surge of enthusiasm for great opportunities, a better credit position, and public plaudits for having done something for the people to make their homes better places in which to live.

INDUSTRIAL GAS HORIZONS

(Continued from page 159)

temperatures. Obviously, the importance of the enclosure will increase with final work temperature.

It has been demonstrated that where speed is the prime consideration, and where work shape and heating requirements permitted, flame impact heating can be used to secure heating times possibly ranging between 5% and 25% of the time required for conventional furnace heating. Figure 10 illustrates the time temperature curves obtained in heating a 1½" diameter steel bar in a furnace at a constant temperature of 1600° F., in a 2500° F. furnace, and in a special flame impact heating setup. The 1575° F. temperature has been located on all three curves to indicate the relative speed secured in heating for quenching. Heating times are approximately 22 minutes for the 1600° furnace, 2¾ minutes for the 2500° furnace, and 1¼ minutes for flame impact heating. In this case, the flame impact heating burners were applied in connection with a complete refractory enclosure.

In another type of application, spot heating can be used to localize the temperature rise as desired for special heat treatments or forming operations, with possibly better economies than can be obtained by heating the entire piece in a furnace.

Some of the spectacular implications of this development have been outlined in a very excellent paper recently presented before this group. There will certainly be a number of future industrial heating jobs for which flame impact heating is the logical answer. There also, of course, will be the much greater field in which precision temperature requirements, provision for soaking at temperature and need for special heating atmospheres will require the use of more conventional heating means. It may be suggested that flame impact heating is a possible alternative in most operations for which the induction type of electrical heating may be used.

Current development work in flame impact heating is concerned with maintaining the necessary accuracy of fuel proportioning and fuel input rate, to make final work temperature a predictable function of time. Some very interesting data is being accumulated on the correlation of flame velocity and heat transfer rates, and there seem to be possibilities of pushing maximum rates of heat transfer well beyond the limits established to date.

Application of Flame Heating

As an example of the application of flame heating, continuous annealing of copper wire, by passing lengthwise through a long gas flame under accurate control, is now a commercial operation with processing speeds far beyond anything which could be expected in conventional furnace heating. Although flame heating naturally fits into spot heating applications and rapid continuous heating of uniform sections, it has been demonstrated that non-uniform sections can be brought to uniform final temperature by suitable application of a number of small burners under individual control.

It appears that equipment for flame

impact heating in the future will embrace both standard burner tips for general application and special tips exactly tailor-made to the requirements of special jobs.

Other Innovations in Heat Treating

About 10 years ago when production for war was the least of our worries one of the Government Arsenals developed a high explosive anti-aircraft shell requiring heat treatment to secure very high and very uniform strength for optimum fragmentation. To secure the required physical properties, a novel quenching method was developed for simultaneously chilling the outside surface and the inside of the cavity with high velocity oil jets. A special design of furnace line was worked out to handle the hardening, quenching and drawing of these shells automatically to guarantee a product of maximum uniformity. The necessary furnace equipment was installed in the Arsenal, placed in successful operation, and the drawings and records were then filed away and forgotten.

A few years ago high explosive anti-aircraft shell suddenly became a prime production requirement. The forgotten design was resurrected. A few minor improvements were made on the basis of operating experience with the original unit and several dozen of these automatic production lines were installed throughout the country to provide a very satisfactory, ready-made solution for one serious war production problem.

The quenching technique developed for shells has been applied to a number of other ordnance items to accelerate the cooling rate on inside surfaces or isolated heavy sections. One example is the large size of the steel cartridge case which requires heat treatment to develop the required physical properties in the heavy base. Incidentally, the development of the steel cartridge case brought with it a host of new heat-treating problems, all of which were eventually solved to permit economical streamline production of this item whenever shortage of brass may make it critically necessary.

Recent Developments in the Non-Ferrous Field

In heating certain analyses of aluminum alloys, a furnace atmosphere free from products of combustion is desirable. To interpret this requirement in a practical furnace design requires either electrical heating or the use of radiant tube heating elements.

The enormous facilities for fabrication and heat treatment of aluminum, which were created almost overnight to meet war demands, have used thousands of radiant tube elements, equivalent to over 120,000 kilowatts of installed electric heating capacity. Most of these installations are located in areas where electric power generating facilities are overloaded at best. Had the radiant tubes not been available for this demand, additional power generating equipment would have been required and a good part of the aluminum fabrication program would inevitably have been set back months or even years.

Many novel uses of fuel gas have accompanied the development of the still young magnesium industry. Gas is used in some smelting operations, and in melting, refining and subsequent heat treatment. There is still ample room for improvements in these new applications to fit in with the important place which magnesium will undoubtedly occupy in the postwar economy.

Bright annealing of copper and clean annealing of brass are now accomplished in direct-fired, recirculating-type furnaces, in which a slightly reducing combustion atmosphere is maintained under accurate control. The current trends in this field are toward continuous handling and faster processing, indicating future replacement of existing equipment.

PRIVATE BREGER ABROAD

New York Journal-American

"He said something about getting used to being under fire!"

Current and Proposed Developments

There are several interesting developments in the field of gas utilization which are at present in the early stages of laboratory investigation. Others have been outlined to receive attention as soon as relaxation of war requirements makes it possible. Some of these, unfortunately, cannot be discussed at this time.

There appear to be promising possibilities in the plating of one metal upon another, or the impregnation of a metal surface with a special alloy element to obtain surface hardness, finish or corrosion resistance by use of metal vapors or metal compound vapors in a special atmosphere or in vacuum. In general, these processes will involve the use of gas fuel for heat and in many cases for production of the special atmosphere required. It is possible that these or similar processes will provide means for surface hardening of non-ferrous alloys, even including the light metals, to open up entirely new fields in product design.

There are promising potentials in the development of special heat-treating cycles for steel, incorporating the idea of austenite transformation at intermediate temperatures to accomplish the same result as quenching and tempering but with retention of considerably greater toughness. The Austempering process now in commercial use is one example of this method of heat treatment. Utilization of high velocity gas quenching, or of new quenching media and technique may broaden this field considerably.

Metals which have been worked down from the molten state or have been electrolytically deposited, necessarily contain gases in solution as well as gases combined with the metal in the form of chemical compounds. The effect of these gases may be beneficial or otherwise but the effect is recognized as being of considerable importance. Investigations are now

projected to evaluate these gas effects and to develop means for controlling residual gases in metals for optimum results. Such control will undoubtedly involve modification of furnace treatments and furnace atmosphere compositions.

The direct reduction of pulverized metal oxides to metal powders without passing through the molten phase has been studied for some years, particularly in the production of sponge iron. While a very impressive number of difficulties remain to be overcome, we can certainly anticipate steady progress in these developments with the eventual appearance of commercial processes in a wide field of application.

Challenge of the Future

Industrial research can be used to achieve various ends. It may look for wider markets for an established product, without improving the product; or it may be directed toward perfecting products and services to meet competition and consumer complaints in present markets. To this extent, it is one of the minimum requirements of industrial management. But a long term research policy must provide for the development of new products, creating new markets to replace those which will inevitably decline. Insofar as we are ready to tackle more diversified fields, to institute more original research and to invest our earnings in the development of new projects, we shall expand the overall field of gas utilization and render increasing service to industry.

The progressive trend of industrial development is toward continuous processes, lighter and stronger structural materials involving more utilization of heat treatment, labor-saving handling methods, cleaner and more pleasant industrial environments, with precision and predictability in final results. In all these objectives gas fuel has made substantial contributions and can play an even more significant part in the future.

Curiosity in experiment, perseverance in development, courage to cross old barriers and to venture into territories yet unexplored, will continue in the future as it has in the past to open up new horizons for industrial gas.

Fight Detroit Tax

DETROIT'S ideas for increasing municipal tax revenues by imposing a gross income tax on its privately owned power and gas utilities are being contested by the Detroit Edison Company and Michigan Consolidated Gas Company.

Both utilities have filed injunction suits seeking to restrain operation of the new city ordinance which imposes a 20% excise tax on gross revenues.

The actions are based on claims that the tax not only is confiscatory, but also infringes on federal taxation functions by levying another tax against excess profits.—*Business Week, Mar. 4*

Florence Stove Wins "E"

THE shell plant of the Florence Stove Company at Kankakee, Illinois has been awarded the Army-Navy "E" for outstanding production of war materials. Presentation of the award was made before 2,000 employees of the Kankakee Florence plant by Rear Admiral Willard A. Kitts.

1942 Production

ACCORDING to Mineral Market Report, No. MMS 1140 marketed production of natural gas in 1942 increased 9 per cent over that in 1941, reaching a new high of 3,053,475,000,000 cubic feet, a figure twice the total amount produced in 1917 and 1918.

Personnel Reports

WITH the acute need for more workers, industry has turned to heretofore little-tapped sources of labor—housewives, school girls, those who have not worked in factories or business, handicapped workers and part-time employees. To assist those executives faced with the problem of recruiting and adjusting the applicants to their new work, the Policyholders Service Bureau of the Metropolitan Life Insurance Company has prepared two reports entitled, "Recruiting Women Workers" and "The Employee Counsellor in Industry."

Copies of either or both of these reports will be sent to executives who address the Bureau on their business stationery. Address: Policyholders Service Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York 10, N. Y.

Natural Gas Act Report

THE Federal Power Commission has published a printed report entitled "The First Five Years under the Natural Gas Act," which reviews the activities of the Commission in administering the Act. It represents a rather complete summary of rate regulation and accounting activities of the Commission, listing rate reductions achieved, rate cases in progress, and accounting procedures established. Copies are obtainable at the United States Government Printing Office, Washington, D. C.

Personnel Service

SERVICES OFFERED

Superintendent or **Assistant** in a carburetted water gas plant. 29 years' experience in all phases of plant operation, light or heavy oil, coke, bituminous gas coal or anthracite fuels, high or low pressure. Have had but two employers. Can report immediately. **1477.**

Combustion Engineer. 12 years combustion engineering including technical, laboratory, design, and field—power and heating plants, industrial furnaces and heating processes. Exceptionally broad background in mechanical engineering. Will accept position with established firm which can offer post war security. 38, married, B.S. Degree mechanical engineering. **1478.**

Production or **General Superintendent** with wide experience in the latest methods of manufacture and distribution of both Coal and Water Gas, desires position with gas company with opportunity to use his knowledge in securing better operating efficiencies. Married, draft exempt, excellent physical condition. A-1 References. Available on reasonable notice. **1479.**

Young man with thorough knowledge of **modern** high and low pressure **gas distribution** practice, desires permanent position with future. Seventeen years of construction and maintenance experience in all phases. Letter giving particulars sent upon request. (38) **1480.**

Comptroller or **Accounting Executive:** Graduate civil engineer, 20 years' experience production, distribution, sales manufactured and natural gas, electricity, petroleum. Accounting, budgetary and finance; systems design for office, sales, shop and warehouse; preparation manuals, precedures and convention papers. Top-notch physical condition. Seeks immediate interview leading to post-war activity; available shortly. **1481.**

Would like position as **Superintendent** carburetted water or coal gas plant, distribution department, or both. Several years' excellent practical experience in both, with good reference. Much new and replacement plant equipment experience, and control laboratory work of coke ovens. No opportunity at present location of being utilized to greatest capacity. **1482**

POSITIONS OPEN

Leading midwest manufacturer of home heating appliances has a real opportunity for an experienced **heating appliance designer** capable of directing group activities. State experience, age, and salary expected. Address Box **0388.**

General Operating Superintendent for manufactured gas company serving mixed coal and water gas in a Southern city. Young unmarried man not subject to draft preferred if properly qualified. **0389.**

Engineer with gas measurement, pipe line, and some drilling experience. Give record of experiences and other pertinent information. **0390.**

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